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A 5-year interim report on a cooperative venture between Harvard University and the public schools of Lexington, Concord, and Newton, Mass. The project, known as SUPRAD (School and University Program for Research and Development) supported or cooperated in nearly two dozen research and development projects during the 5 years.

Investigations dealt with the use of lay readers to aid English teachers, the uses of data processing for educational problems, the ability spread among students, team teaching, programed instruction, and many other problem areas.

The appendixes include a full listing of the projects undertaken, a list of related doctoral theses, and a bibliography of approximately 40 titles.

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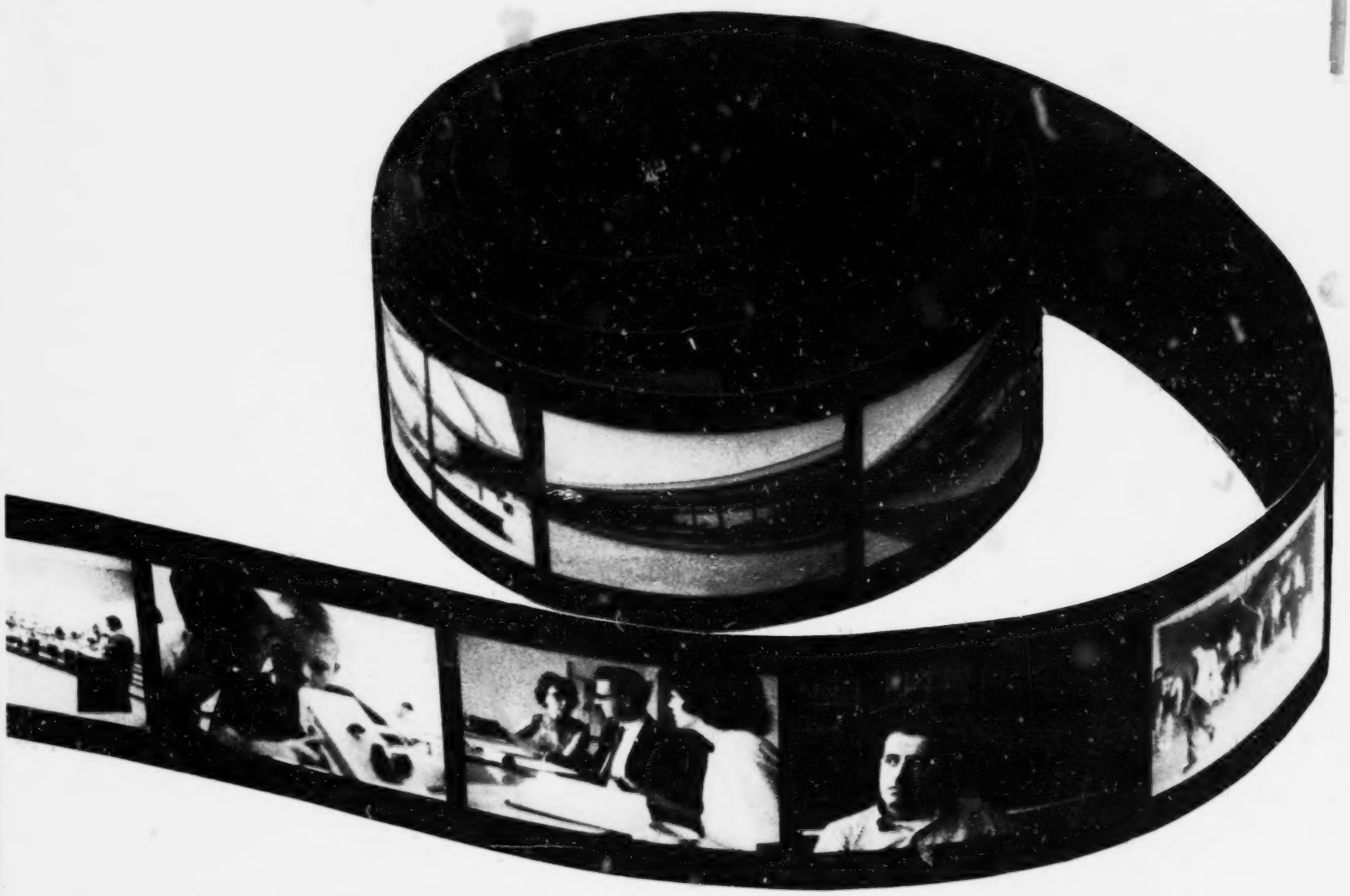

An Interim Report
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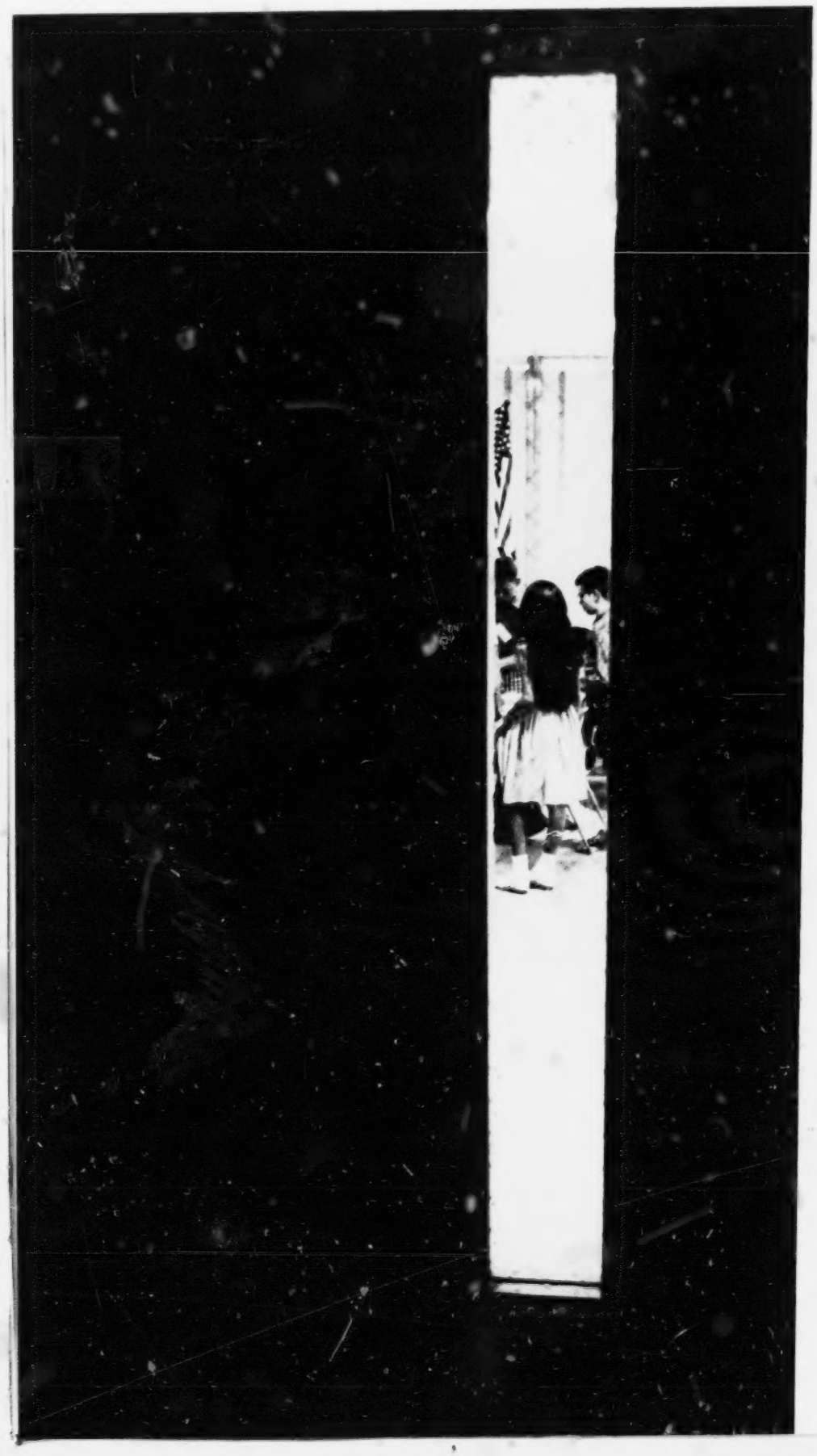

An Interim Report on the School and University Program for Research and Development

1957-1962

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Medill Bair

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Introduction

This is an interim report on the first five years of cooperative efforts by three public school systems and a university to attack fundamental problems of American education through the School and University Program for Research and Development (SUPRAD).

In considering this report, several points should be borne in mind. First, most of the problems which SUPRAD was organized to attack are of long standing on the American educational scene. Second, SUPRAD itself did not spring full-blown into being overnight, nor does it represent a revolutionary way of operating. Many elements in its approach to educational problems are the outgrowth of years of prior efforts, and the relationships it has attempted to establish between the schools and the university have much in common with the relationships between medical schools and teaching hospitals. What *is* new is the application of these relationships to certain kinds of educational problems.

Third, educational problems are interrelated. They cannot be separated into compartments and dealt with in isolation. The over-all problem of providing education of high quality for our youth ultimately depends on the quality of the personnel in the schools, and this in turn depends on both the quality of their preparation and on vigorous programs of educational research and development. SUPRAD grew out of this complex of interrelated problems, and it functions within the larger framework of scholarship, teacher training, school-university relationships, and the effort to bring the "educator" and the "scholar" closer together. Although this report will deal principally with SUPRAD as an organization, it must recognize the wider context within which it exists.

Fourth, the fundamental premise on which SUPRAD operates is that significant improvement in American education requires long-range programs of thoughtful planning and effort by numerous different individuals and organizations working on many fronts. Dramatic breakthroughs cannot be expected, and panaceas are unlikely to be discovered. It is long-term results, rather than short-term gains, that count. It would therefore be both premature and unrealistic to judge SUPRAD solely on the basis of whether its individual projects have been promising or unpromising. During the first five years of its operation, it has had its share of both—and learned from both. On balance, these five years have provided sufficient reason to be hopeful about both the approach used and the prospects of long-term success. It is on this basis that we press forward with the enterprise.

FRANCIS KEPPEL
Dean, Harvard Graduate School of Education and chairman, SUPRAD Administrative Board

In the Spring of 1959, the Ford Foundation made an eight-year, $2,800,000 grant to the Harvard Graduate School of Education for a long-range program with three major objectives: (1) improved patterns of recruitment, training, and career development for teachers, administrators, and educational specialists; (2) improved relationships between scholars and educators, giving these two words their broadest possible interpretation; and (3) cooperative research and development by school systems and the University on fundamental educational problems. In that same year, the Foundation made other grants totalling more than fifteen million dollars to eighteen other colleges and universities throughout the country for programs with similar aims.[1]

This dramatic gesture by the Foundation climaxed several years of thought and action on a variety of fronts involving school systems, colleges, and the University. During these years, a number of basic problems in American education were identified and steps taken toward their solution. One such step was the School and University Program for Research and Development (SUPRAD), which was established in 1957 with financial assistance from the Fund for the Advancement of Education and which received further support from the 1959 Ford grant. Joining with Harvard in this enterprise were the public school systems of Concord, Lexington, and Newton, Mass. SUPRAD is therefore both an outgrowth of earlier efforts and an extension of these efforts in a new direction. Before discussing SUPRAD itself, it may be helpful to outline the problems from which it sprang and the earlier steps leading to its establishment.

[1] Barnard College, Brown University, Bucknell University, Central Michigan University, University of Chicago, Claremont Graduate School, Cornell University, Duke University, Johns Hopkins University, Michigan State University, New York University, George Peabody College for Teachers, University of North Carolina, University of Southern California, Stanford University, Vanderbilt University, Wayne State University, University of Wisconsin.

The Question of Quality

Early in the 1950's, the Faculty of Education at Harvard had begun a reexamination of the general question of quality in American education, and the ways in which a graduate professional school could best work toward its improvement. It was already clear that the quality of education in American schools depended heavily on the quality of their staffs, and that one key to staff quality lay in the kind of preparation these people receive for their jobs. Harvard, under the leadership of President James Bryant Conant, had established a Master of Arts in Teaching Program in 1936. This program was a joint effort by the Faculty of Arts and Sciences, the Faculty of Education, and the Radcliffe Graduate School to improve the academic and professional training of secondary school teachers. While the program had difficulties in its early years[2] and remained relatively small in size until the end of World War Two, it provided a foundation on which further efforts could be built. Since 1951, the Master of Arts in Teaching has been a one-year program which includes graduate study in the candidate's teaching field; introductory study of disciplines basic to education, such as psychology, sociology, history, and philosophy; and a supervised introduction to classroom teaching. It is now the largest single degree program at the Graduate School of Education, enrolling some 225 students each year.

Throughout the 1950's—to use a medical analogy—the Faculty of Education held continued consultations with schools and colleges on the health of American education. The general diagnosis was that, although numerous American schools at all levels were doing an excellent job, the general tone of the patient's health was far short of what it could be. Further consultation revealed problems in at least four areas: personnel, preparation, research and development, and financing.

Career Men Needed

It was clear that not enough high quality college graduates, especially men, enter teaching and other educational jobs. Of those who do, not enough stay on as "career" personnel, increasing in knowledge and com-

[2] See "Training the Scholar-Teacher," by Theodore R. Sizer, HGSEA *Bulletin*, Spring, 1962.

petence through a lifetime of service. Reasons for this situation are not hard to find: as a group, teachers have lower social status and salaries than workers in other fields which require comparable training and experience. All too often they feel a sense of stagnation in their jobs, suffer from a lack of contact with scholarship and new ideas, and see no way to advance either in salary or status except to desert the classroom for administrative or other assignments which remove them from direct contact with children.

A related reason lies in the numerous stereotypes about teacher education which persist in American society. The reputation of "Education" courses, both at the undergraduate and graduate level, has been poor with the very students such courses desperately need to attract. These courses are seen by many as repetitious and empty of intellectual content. Teacher training in general is considered to emphasize method rather than substance, and this belief tends to drive the ablest liberal arts and science students away from preparation for teaching as a career. There is also a fairly long history of misunderstanding and antagonism between the "scholar" and the "educator,"[3] caused in part by the withdrawal of many American universities from their responsibilities for teacher preparation in the early years of this century.

A second basic problem has been the inadequate and unrealistic preparation given to many prospective teachers—a problem which gave rise to Harvard's Master of Arts in Teaching Program. One reason for this problem is the fact that the schools themselves, which are the logical agencies to introduce new teachers to classroom practice, have not been effectively included in this part of the teacher preparation process. Far closer cooperation is needed between schools, colleges, and universities, in which scholarship, research and training are more closely integrated. Under such an arrangement, the school can contribute training, insights and judgments based on experience in the operating situation while the college and university can contribute knowledge based on research and scholarship. The analogy here is the arrangement that exists between medical schools and teaching hospitals, in which the faculty of medicine also constitutes much of the hospital staff.

Inquiry and Money

A third problem has been the uneven quality of research and development in American education,[4] and the difficulty of translating new findings speedily into practice. Large gaps remain in our knowledge about teaching and learning and about the ways in which these processes can be made more effective. The limited budgets and staffs of most local school districts, and the constant demands of daily operations, have prevented them from doing very much research and development of their own. University research has frequently dealt with questions which, to the classroom teacher, appear abstract, technical, and remote from his daily problems. Schools and universities need to find some way to work together on problems which both consider important, and to apply the results of this investigation more quickly to the classroom.

Finally, there is the perennial problem of financing for the nation's educational efforts. With a few scattered exceptions, financial support for the operation of public school systems, teacher training institutions, and educational research and development programs has been far too small to enable them to meet the many tasks they face. Local control and financing of public education means that the economic resources available for its support vary widely from one community to another. The

[3] See "On the Conflict Between the 'Liberal Arts' and the 'Schools of Education," by Howard Mumford Jones, Francis Keppel, and Robert Ulich, American Council of Learned Societies *Newsletter*, Vol. 5, No. 2 (1954), pp. 17-38.

[4] See "Research in Education: Where Do We Stand?" by John B. Carroll, HGSEA *Bulletin*, Winter, 1960.

Intern teachers watch a classroom lesson in progress. Later they will try handling a class themselves.

importance and cost of quality teacher preparation has been inadequately explained to the American people, and is therefore poorly understood. Even more obscure to most is the nature, importance, and cost of educational research and development, and few voices are therefore heard in its support.

Early Steps Toward Better Quality

So much for the diagnosis. What of the treatment?

The past decade has seen progress on several of the problems just outlined. Universities have taken a renewed interest in the problems of the schools and the ways in which they can contribute to their solution. Efforts have increased to recruit high quality people into teaching careers, and to give them effective and realistic preparation for the kinds of jobs they will be doing. Schools and universities have begun to share in preparing these people for careers in education, and to carry out cooperative research and development intended to make their careers more effective and rewarding. Harvard has undertaken a number of new programs, in cooperation with school systems and colleges, designed to improve the recruitment and training of teachers and other educational personnel. A brief description of some of these programs is appropriate here.

The Twenty-Nine College Cooperative Plan

The Master of Arts in Teaching Program has already been mentioned. Like the Master of Education program for inexperienced elementary candidates, begun in 1951, it was designed mainly for liberal arts graduates who would devote a further year to preparation for teaching. If these and other programs at the Graduate School of Education were to have more influence, they needed to expand their sources of potential students. One answer came in 1952 when Harvard joined with a group of Eastern liberal arts colleges[5] to establish the Twenty-Nine College Cooperative Plan. This plan, which now has working agreements with 42 colleges throughout the country, set up a formal structure to recruit high-ranking liberal arts graduates into teaching and other educational careers. A faculty member at each of the colleges agreed to distribute information about teaching as a career and about Harvard's graduate programs of teacher preparation. This includes interviewing promising candidates and helping to process their applications. Harvard set aside scholarship funds for students from these institutions with the help of the Fund for the Advancement of Education.

The results of this plan have been encouraging. During the past ten years, more than 1,200 graduates of the Twenty-Nine Colleges have enrolled in teacher preparation programs at Harvard. A recent study of the academic aptitude of students in the Master of Arts in Teaching and Master of Education (elementary) programs showed that they rank on a par with graduate students in the physical sciences and in medicine at three other universities, and well above graduate students in education at nine other universities. Interestingly enough, the Twenty-Nine College Plan has also worked on behalf of graduate teacher training at other institu-

[5] Amherst, Barnard, Bates, Bennington, Bowdoin, Brandeis, Brown, Bryn Mawr, Colby, Colgate, Connecticut, Dartmouth, Hamilton, Haverford, Holy Cross, Lafayette, M.I.T., Middlebury, Mt. Holyoke, Pembroke, Radcliffe, Sarah Lawrence, Simmons, Smith, Swarthmore, Vassar, Wellesley, Wheaton, and Williams.

A Harvard intern works with a small group of elementary pupils in the Harvard-Newton Summer Program.

tions than Harvard. Increasingly, representatives of the Plan have encouraged able undergraduates to prepare for teaching careers through graduate study at whatever institution fits their particular needs and preferences. As the number of institutions offering the Master of Arts in Teaching and similar degree programs has increased, this encouragement has had the effect of helping all.

The Internship Plan

Harvard also took steps to improve its programs of preparation for teaching and other educational posts. One of these was the Internship Plan, established in 1955 with the cooperation of ten of the original Twenty-Nine Colleges and nine Eastern Massachusetts public school systems.[6] This plan provides an alternative to the unpaid apprenticeship which has long been included in Harvard's programs of teacher preparation. It offers prospective teachers a chance for paid, fully responsible classroom teaching as a part of their degree requirements. Interns begin their preparation at the Harvard-Newton Summer School in Newton, Mass., which now enrolls more than 1,000 pupils from seven communities in grades 2 through 12. Interns are introduced to classroom teaching under the close supervision of experienced master teachers, and also take University course work in curriculum and methods appropriate to their teaching fields. During the following academic year, the interns alternate a semester of full-time course work at Harvard with a semester of teaching in one of the cooperating school systems, while continuing a small amount of University course work. Pairs of interns are hired by a school system to fill the job of a beginning teacher, with one intern teaching the first semester and the other replacing him during the second semester. Each intern is paid $2,100 for the half year of teaching by the school system, which must agree to hire him as an intern before he can be admitted to the Plan.

The Internship Plan offers several advantages, both for the student and for the teacher preparation process. For the student, it provides a closely supervised intro-

[6] Colleges: Amherst, Harvard, Holy Cross, M.I.T., Mount Holyoke, Radcliffe, Smith, Wellesley, Wheaton, and Williams. Schools: Belmont, Brookline, Concord, Lexington, Natick, Newton, Wayland, Wellesley, Weston, Winchester. Arlington and Needham joined the Internship Plan this year.

duction to classroom teaching during the summer, followed by a semester of full responsibility for a class of pupils during the regular academic year in which he can try his wings while still receiving guidance and help from Harvard and school system personnel. The income from the intern teaching semester helps substantially to meet the expenses of the student's degree program, and encourages many able college graduates to enter graduate teacher training who might otherwise consider it beyond their means. The internship also helps teacher training to compete more effectively for top students with other fields of graduate study where financial aid is generally more substantial. Finally, the Internship Plan, originally begun with Ford Foundation subsidy, is now a self-financing operation requiring no additional expenditure by either the schools or the University. While the Apprenticeship Plan has continued, the proportion of Harvard teacher candidates enrolled in the Internship Plan has steadily increased until more than one-third now elect this alternative. During the coming academic year, 120 Harvard interns will teach at the elementary or secondary level in the twelve cooperating school systems. A number of other colleges and universities in the United States have adopted internship plans, some of them patterned after the Harvard program.

Other New Patterns and Programs

Changes were also made in programs of preparation for other educational positions. A program in guidance, established in the early 1950's, has been expanded considerably since that time and has developed a system of internships in counseling and psychological services in school systems and in the Judge Baker Guidance Center in Boston and Newton. The course of study leading to the Doctor of Education degree in educational administration was revised in 1952, when the Administrative Career Program began. This program prepares candidates for major administrative positions through a combination of academic and professional course work; clinical study in a school system through the Harvard Center for Field Studies; and completion of an administrative project, instead of a thesis, under faculty guidance. Last fall this program was lengthened to include two years of resident study rather than one. Beginning this year, Harvard will also offer a doctoral program for a small number of experienced administrators which takes account of their experience, interests, and special needs.

Harvard has also established programs for experienced school personnel in other fields. The Academic Year Institute, a one-year program for teachers of high school science and mathematics, began in 1957 with financial assistance from the National Science Foundation, and will broaden its scope this year to include faculty members from teacher training institutions as well. The John Hay Fellows Program for secondary school teachers of the humanities began in 1959 with help from the Greenwood Fund of the John Hay Whitney Foundation. Both of these programs, which are sponsored jointly by the Faculty of Education and the Faculty of Arts and Sciences, permit their students to spend an academic year at Harvard during which they take courses in the fields of their academic and teaching interests.

One of the responsibilities of a professional school is to increase knowledge in the field for which it prepares practitioners, and members of the Faculty of Education carry on research on a variety of fundamental questions. To provide a focus for inquiries into teaching and learning, the Laboratory for Research in Instruction was established in 1956. Serving the interests of students and faculty members in all programs of the School, the Laboratory conducts research on the teaching of English and foreign languages, science and mathematics, and social studies, and on instructional methods. Members of the Laboratory staff and graduate students do part of their work in cooperating public school systems.

SUPRAD: The Next Step

It should be apparent from this brief historical sketch that Harvard's activities in teacher preparation and research had moved steadily toward closer working relationships between schools and the University for a number of years. SUPRAD was the next logical step: a formal organization through which they could carry out cooperative programs of research, development, and training that would be beneficial to both and to American education as well. For the sake of effective operation, SUPRAD was organized as an intensive relationship between the University and a limited number of school systems, with each sharing in the identification of problems to be attacked and the establishment of priorities among them.

A Rationale for Progress

SUPRAD is *not* a research bureau or institute of the conventional type, with its own staff of researchers who work in the schools when the occasion demands. It is rather a working arrangement which makes it possible for both school and university people to plan, carry out, and evaluate research and development efforts together. SUPRAD was founded on the conviction that both the school and the univerity should work toward the improvement of education, and that neither can do the job as well by itself as the two working together. The university has the resources of a wide community of scholars from many disciplines, and emphasizes theoretical knowledge and research. The schools have the problems and the teachers who can bring a working knowledge of education to efforts at their solution, along with the pupils and the buildings which make it possible to conduct research and development in a "real" situation.

It is worth noting that this concept is not without precedent. As early as 1912, a Department of Educational Research existed in the Newton Public Schools whose director, William Setchel Learned, was also a member of the Harvard faculty. Writing in the first issue of the *Harvard-Newton Bulletins*, published in 1914, Dr. Learned made the following interesting comment:

> The study of school problems is not solely a function of university educators, but of all teachers; and that teachers share the scientific labor which educational progress now

demands is essential both for the sake of the school and for the sake of the teachers themselves.[7]

Both Dr. Learned's joint appointment and the shared responsibility which he urged on schools and universities are important elements in the long-range approach of which SUPRAD is a part today.

From its beginning, SUPRAD was based on the assumptions that:

- If major changes are to be made in American education, they can best be made through the close cooperation of public schools and universities.
- The effort to effect change and improvement must be continuous; short-term or half-measures may be both inconclusive and wasteful of resources.
- First attention should be given to the training, organization, and use of personnel in the schools, since all basic problems in education can eventually be traced to personnel quality.
- The enterprise must be firmly based on research and unbiased evaluation—and scholars and practitioners in many fields from both the schools and the universities are needed for this task.
- The universities should continue to concentrate on the recruitment and preparation of leaders, of men and women who will devote their professional careers to educational work, and whose programs of preparation should be closely linked to this venture.

SUPRAD's Organization

Governing SUPRAD is its Administrative Board, which includes the superintendents of the three member school systems; six members of the Harvard Faculty of Education; and the Executive Secretary of the New England School Development Council, an organization of 160 New England public school systems which share information about common problems. The Board establishes general policies for the entire organization; reviews and approves proposals for research and development projects which request its support; and allots funds to those it considers worthwhile. SUPRAD also tries to find financial support from other agencies for projects which are beyond its resources. A basic requirement of SUPRAD projects is that they must deal with problems of interest and importance to both the schools and the university. They must be expected to improve practice and add to existing knowledge, not only in the specific situation in which they are conducted but in other school systems as well.

Directly under the SUPRAD Board is the Administrative Staff, which is responsible for recommending and carrying out Board policy, making budget and personnel recommendations, and coordinating SUPRAD's activities in the schools and the university. This last function includes liaison and communications within the organization as well as contact with the educational profession and the public. The Administrative Staff, along with a Board member, constitute the Screening Committee, which evaluates all project proposals and budget requests and recommends action to the Board.

Once a project is approved, the Board provides funds and, in many cases, personnel necessary to give it a full and fair test. Projects have ranged from small, short-term exploratory ventures to complex enterprises requiring many years to complete. The school systems involved usually contribute a portion of the cost of a project, either by direct appropriation of funds or by providing facilities, supplies, staff time, and other assistance. A project which shows promise of making a significant contribution to educational knowledge and practice may be financed over a long period of time in order to develop it to the point where it can be fully evaluated and re-

[7] William Setchel Learned, "The School System as an Educational Laboratory," *The Harvard-Newton Bulletins*, No. 1, July, 1914.

produced elsewhere.

In most cases, a SUPRAD project is directed by a committee whose chairman is the project director. The committee acts as a policy-making body for the project and as a resource group for its director and staff. The size and membership of the committee depends on the size, nature, and needs of the project. Some smaller projects have been headed by a director working with the help and advice of university consultants and members of the SUPRAD Administrative Staff.

Another important element in the SUPRAD organization is the Communications Committee, which includes teachers and administrators from the three SUPRAD school systems. The members of this committee are responsible for informing their colleagues of the aims, activities, and procedures of SUPRAD, and for informing the SUPRAD staff of the interests, ideas, attitudes, and desires of people in the school systems. The Communications Committee has also worked with the Administrative Staff on a pilot project of research dissemination under a contract with the Cooperative Research Bureau, U. S. Office of Education.

A Perspective on SUPRAD's Projects

During its first five years, SUPRAD has supported or cooperated in nearly two dozen research and development projects, and has undertaken other activities in support of its general aims. While each project has had its particular aims and emphases, most of them have dealt with different aspects of a small group of related problems. They can therefore best be discussed from the viewpoint of the problems which SUPRAD has chosen to attack. These problems can be summarized under four general headings: personnel, curriculum and teaching methods, technology, and dissemination.

Surveys of the Terrain

When embarking on a new venture, it is frequently helpful to survey the existing terrain, and to make occasional checks on the direction in which you are headed. Some early SUPRAD projects were of this general type. With SUPRAD sponsorship, the Harvard Center for Field Studies conducted two comprehensive field surveys in Concord, involving studies of the organization, administration, curriculum, financing, and other aspects of the Concord Public Schools. The Center also conducted a similar survey in Lexington, and a more limited study of the SUPRAD Junior High School Grouping Project in Newton. These surveys provided clinical field experience for doctoral students in the Administrative Career Program, and yielded information useful to the school systems in their evaluation and planning.

Time and Talent

Since the quality of instruction in the schools ultimately depends on the quality and use of staff, SUPRAD has explored various ways in which these factors can be improved. Recruiting able people into teaching positions and giving them better preparation for their jobs is the first step in this direction. But how can their time and talents be used most effectively?

One approach to this question has been to change the

Lexington architect Richard S. Morehouse gives a guest lecture to a large group at Lexington's Estabrook School.

Charlotte Levens, a team leader, follows up a large-group lesson with a small group of pupils.

organization of the teaching job so that the roles, responsibilities, and rewards involved are more nearly comparable to the knowledge and competence of the individual. It should also be possible for a superior teacher to influence a larger number of pupils and teachers than is possible under traditional forms of organization, and to advance in status and reward without necessarily leaving the classroom. In Lexington, SUPRAD has reorganized the staffs of two elementary schools into teaching teams, three in each school, whose members share in planning, carrying out, and evaluating the instruction of a given group of pupils. In general, teams of six teachers are jointly responsible for approximately 180 pupils on two adjacent grade levels. Each team includes a hierarchy of positions headed by a *team leader*, an experienced master teacher with both leadership ability and special knowledge in some curriculum area. There are also two *senior teachers*, each of whom has special knowledge or skill in a curriculum area that complements those of the other and of the team leader. Filling out the team are three *teachers*, who may be experienced people with broad general training or teachers with relatively little experience or specialized knowledge. Three specialist teachers—one each in art, music, and physical education—handle instruction in these subjects for pupils in all three teams.

A Miniature Faculty

Ideally, this arrangement provides a miniature faculty that includes specialists in each area of the elementary curriculum, with each faculty member doing the jobs for which he is best qualified. This does not mean departmentalization, with each specialist teaching only his special subject. While the team leader and senior teachers are instructional leaders in their special fields, all team members teach all or most subjects in the curriculum, with the specialist using his knowledge and skill to help the entire team do a better job of instruction. This may include such things as planning a unit of instruction, helping another teacher to prepare a lesson, or teaching one or more large-group lessons in a particular subject. Besides his specialist function, the team leader is generally responsible for coordination of the planning and operation of his team; supervision and training of junior or less experienced team members; evaluation of curriculum materials and instruction; and assignment of pupils to instructional groups. Because of their increased responsibilities, senior teachers are paid a salary supplement of $500 per year beyond the regular schedule, and team leaders receive an additional $1,000.

Team teaching therefore offers the potential advantage of more effective and continuous leadership than the traditional form of school organization. The principal, freed of many routine administrative responsibilities by the team hierarchy, can function more effectively as an educational leader. He can spend more time on staff supervision and training, curriculum development, and evaluation of the instructional program and its effect on pupils. To coordinate the efforts of individual teams, the principal and the team leaders constitute the Administrative Cabinet, which makes administrative decisions for the entire school. These people plus the senior teachers make up the Instructional Cabinet, which makes decisions on instructional matters affecting all teams within the building. It is expected that a school operating with a fairly stable nucleus of upper echelon career people, who have greater and more direct responsibility for the planning and supervision of instruction, will in the long run have greater continuity in its over-all program in spite of turnover at the teacher level.

Since the start of the project, SUPRAD has been developing and collecting information about these and many other aspects of team teaching. While this investigation is still incomplete, the information obtained so far is encouraging enough to warrant optimism about its long-term promise. We hope within the next few years to

be able to state with more confidence what we know, what we suspect, and what we still need to know about team teaching.

Aides Can Help

Another approach to the problem of better staff use is to provide people who can take over some of the routine or time-consuming parts of the teacher's job, freeing the teacher to spend more time on things which only he can do best. Several SUPRAD projects have demonstrated that people are available in the community to do these nonprofessional or semi-professional jobs, and that they can be effective in them. The Team Teaching Project uses two kinds of these nonprofessionals: the teacher aide, who relieves teachers of such non-instructional tasks as supervising lunchroom and recess periods, bus arrivals and departures, operating mechanical teaching aids, and correcting objective tests; and the clerical aide, who does such routine tasks as typing, duplicating, filing, and recording pupil attendance.

A third type of aide is the contract corrector, who helps the high school English teacher to read student compositions and who holds conferences with students about their written work. The Contract Correcting Project, financed jointly by SUPRAD and the Cooperative Research Program of the U. S. Office of Education, recruited and trained college-educated housewives in three communities as contract correctors and studied the effects of their use. The study showed that, given a "warm-up" period in which to learn how to work together, the corrector could free the teacher from much of the burden of theme reading involved in teaching composition. It also showed that classes helped by correctors generally wrote better than those without this assistance.

The SUPRAD Language Laboratory Project in Concord involved a fourth kind of aide: a French-speaking laboratory assistant who helped the regular teacher to operate the laboratory equipment, build a library of tape-recorded speech models, and monitor student performance. The laboratory assistant enabled the teacher to use the laboratory equipment more efficiently and to spend more time on other aspects of language instruction.

The Raw Materials

But better organization and use of staff alone is not enough. In order to make teachers most effective, we must also give them better curriculum materials with which to work, develop more effective ways of using these materials and of training teachers in their use, and provide teachers with more efficient instructional tools with which to do the job. These efforts obviously involve investigations into the conditions of teaching and learning: the size of instructional groups, the basis on which they are formed, and the length of time for which a given group is scheduled for instruction in a particular subject. SUPRAD has conducted inquiries into all of these areas.

One such project in Concord enlisted the help of scientists, engineers, and others in the community who use mathematics in their daily work. These people suggested improvements in the high school mathematics curriculum, spoke to classes about scientific and industrial applications of mathematics, arranged field trips to industrial concerns, and worked with individual students on advanced projects of study and research.

Two other SUPRAD projects have dealt with mathematics curriculum. One of these involved the preparation of supplementary teaching materials for talented junior high school students. Another developed and tested programmed instruction units in mathematics for seventh and eighth graders.

The Team Teaching Project has involved a large amount of curriculum development and revision. As in many other SUPRAD projects, much of this work has

A teacher aide supervises a group of pupils who are listening to a lesson previously taped by a member of her teaching team.

been done on a cooperative basis by both teachers in the schools and by faculty members and graduate students from Harvard. Examples include the revision of the entire social studies curriculum in grades one through six; curriculum development and in-service training in science; and the development and experimental use of programmed instruction in spelling, reading, and mathematics. The Newton Junior High School Grouping Project has developed special curriculum materials in English, mathematics, and science, and has adapted other materials for use in these subjects. The Social Studies Project in Concord involved the development of a large body of curriculum materials for use in teaching junior high school pupils. The Behavioral Sciences Curriculum Project, also in Concord, explored the possibility of introducing instruction in anthropology, psychology, and sociology into the high school curriculum.

Methods Are Important

Nearly every SUPRAD project has encountered the problem of teaching methods to some degree, although some have dealt with it more specifically than others. The Social Studies Project in Concord involved the development and teaching of a thought process to be used in the analysis of controversial political and legal issues; the experimental use of two different teaching styles; and the investigation of relationships between student personality, academic ability, and the thought process and teaching styles used. The Newton Junior High School Grouping Project included efforts to discover whether teachers were able to differentiate instruction among various ability groups. The Team Teaching Project has faced the need to develop teaching methods appropriate to instruction in groups of varying sizes at numerous different ability levels.

The Tools of Teaching

A number of SUPRAD projects have attempted to make the most effective use of various teaching tools. One project involved the experimental use of a language laboratory in the Concord High School and an effort to evaluate its effect on foreign language instruction. The Concord-Carlisle High School now has two language laboratories in regular use. Another project developed

a series of recordings for use by students of French in Newton High School. Teachers in the team project at the Franklin and Estabrook Schools in Lexington have experimented with motion pictures, slides, tape recordings, television, and other audiovisual aids to instruction. The Franklin School also provided subjects and facilities for the experimental use of teaching machines in elementary spelling and reading instruction. A different application of technology to education is the Data Processing Project, which has explored the application of computers and other high-speed data processing equipment to such problems as the keeping of pupil records, the scheduling of a high school, the evaluation of standardized tests, and the use of the computer in teaching mathematics.

Grouping and Scheduling

Several projects have dealt with questions of grouping and scheduling. The Newton Junior High School Grouping Project included an effort to develop flexible grouping and scheduling procedures more appropriate to the wide range of ability among junior high school pupils. The Newton Plan experimented with the use of large-group instruction in English and other subjects in Newton High School. The Team Teaching Project has questioned the time-honored concept that the ideal size of an instructional group is somewhere between 20 and 30, and has taught pupils in groups ranging in size from 2 to 150. It has also experimented with various criteria for the assignment of pupils to groups, and with the scheduling of different instructional groups for varying lengths of time. The Data Processing Project has used a computer to assign pupils to classes from a high school master schedule in a matter of minutes, and is investigating the possibility of developing the schedule itself by computer. This effort, if it is successful, could save enormous amounts of time which could be put to better educational uses.

Communication and Translation

SUPRAD has also been concerned with the distribution of information resulting from educational research, and the speedy translation of new knowledge into practice. The structure of SUPRAD itself, with schools and the University both represented on the Administrative Board, encourages communication on this point. So does the Communications Committee, whose membership and purposes have already been mentioned. Another means of communication has been joint meetings of the SUPRAD Board and the School Committees of the member school systems, held twice a year to exchange information about common concerns. SUPRAD has also distributed information about its own projects to educators and laymen; project directors, Board members, and staff personnel have published articles in professional and general periodicals; and limited numbers of interested persons have visited SUPRAD projects. Finally, through its Research Dissemination Project, SUPRAD has investigated methods for distributing research information to school personnel and evaluating the results of this distribution.

New Projects

Projects approved by the SUPRAD Administrative Board for the 1962-63 academic year include two which are concerned with a closer integration of theory, research, and practice in the field of guidance. One will investigate the relationships between guidance practice in the schools and the programs of training and research at Harvard, drawing on the knowledge and skill of a wide variety of people in the schools and the University. Another will develop and test a training course in behavior change for under-achieving junior high school pupils designed to help them cope more effectively with their environment.

A Summary of Working Relationships

While SUPRAD's efforts have chiefly taken the form of specific research and development projects, this does not tell the whole story. SUPRAD is part of a long-range effort on many fronts to develop closer working relationships between schools and the university in the fields of teacher recruitment, training, and research. Many such relationships had already developed before SUPRAD began. More have developed since—some an outgrowth of SUPRAD, others in the same spirit of cooperative action that led to SUPRAD's establishment. The long-range goal is a network of such relationships comparable to those between medical schools and teaching hospitals, in which training, research, and service are closely integrated and in which many staff members serve both institutions. A professor of surgery in a medical school, for example, may also be head of the surgical service in a teaching hospital. He may carry out his duties in a number of ways: by lecturing to students in a university classroom, by working in a research laboratory, or by performing a surgical operation in the hospital with medical students watching him. Granting that the medical analogy should not be interpreted too literally, and that it has been realized in a limited and imperfect way in the school-university context, it would still be useful to summarize the kinds of working relationships that have developed.

Scholars and the Schools

University faculty members have become more closely involved with the schools and their problems, including those of a practical as well as a theoretical nature. This involvement has ranged from consultation on a specific problem, such as the development of curriculum materials for a given subject and grade level, to actual participation in the planning, execution, and evaluation of research and development projects in which the professor sometimes steps into the teacher's shoes to teach an experimental lesson.

For their part, an increasing number of teachers and other school staff members have become more interested in the theoretical aspects of their work, and have frequently enrolled in graduate courses at Harvard and elsewhere to pursue this interest. This has led to the development of the new role of teacher-researcher which, while it is still in its infancy, promises to achieve a closer integration of research and practice to the benefit of both. The Director of the SUPRAD Junior High School Grouping Project, for example, is a former English-Social Studies-Guidance teacher in the Newton Public Schools. A junior high school mathematics teacher in Concord directed a two-year SUPRAD project in the programming of junior high school mathematics, and now directs a larger project in mathematics under the sponsorship of the Harvard Committee on Programmed Instruction. The Coordinator of the Data Processing Center in Newton Public Schools now divides his time between this function and research activities in the SUPRAD Data Processing Project.

Toward Better Training

Graduate students at the University, particularly those enrolled in doctoral programs, also benefit from the

closer relationship with school systems. Paid internships for elementary and secondary teacher candidates have already been described. Field surveys by the Harvard Center for Field Studies provides clinical training for future school administrators who help to plan and carry them out. Advanced graduate students in guidance at Harvard serve apprenticeships or paid internships in several public school systems, colleges, and industries as a part of their degree programs. Many of them have found jobs in the Newton Public Schools, which share the conviction of the Harvard guidance faculty that counselors need not have prior teaching experience. The Laboratory for Research in Instruction frequently employs doctoral students as research assistants in projects involving school systems. Doctoral candidates in teacher education and other programs serve supervisory internships in school systems as a part of their degree work. Graduate students in other fields have been research assistants in SUPRAD projects, and several have based their doctoral theses or projects on these activities.

Experienced school personnel have also benefited from the working relationship between school and university. The Harvard-Newton Summer Institute in Guidance, a part of the Newton Summer High School, provides training for experienced teachers, counselors, and administrators who wish to improve their skill in and understanding of counseling. A Summer Institute in Supervision, held in cooperation with the Harvard-Newton Summer Program, provides theoretical and practical training in supervision for teachers and administrators, many of whom are responsible for the supervision of Harvard apprentices and intern teachers during the regular academic year. The Harvard-Newton Summer Program has been a base for specialized programs of in-service training, such as workshops for teachers in the Lexington Team Teaching Project. Finally, the Team Teaching Project encouraged the development of the Harvard-Lexington Summer Program, established in 1961 to allow experienced teachers and administrators to investigate the theory and practice of team teaching at the elementary and junior high school levels.

Joint Appointments

Another facet of the school-university relationship is the joint selection and appointment of staff. A half dozen such appointments help to link training and research more closely to practice. For example, the Assistant Superintendent for Pupil Personnel Services in the Newton Public Schools is a Lecturer on Education at Harvard, as are Newton's supervisor of art and head of the High School Mathematics Department. Another kind of joint appointment is that of the Director of Research and Development in the SUPRAD Team Teaching Project in Lexington, who is also an Assistant Professor of Education at Harvard. This year, Newton and Harvard jointly appointed an elementary principal who is also Director of the elementary section of the Harvard-Newton Summer Program and a Lecturer on Education at Harvard.

Joint appointments by the Faculty of Education and other Faculties and departments of the University illustrate the continued effort to link academic and professional study more closely together. Such appointments this year include the fields of mathematics, psychology, teacher training, philosophy, cultural anthropology, history, sociology, Romance Languages, and applied science.

This quick summary of cooperative school-university efforts is intended to illustrate the range and depth of their concerns. It should not be taken to indicate that these efforts are completed. Continued analysis and exploration will probably show many other areas in which school and university can work more effectively together. The extent to which such efforts continue will provide one measure of SUPRAD's long-term significance.

Descriptions of Selected Projects

SUPRAD's projects have already been discussed from the viewpoint of the kinds of problems which they have attempted to attack. The following brief descriptions give somewhat more specific information about a representative selection of individual projects. For a more complete project listing, see the Appendix.

Behavioral Sciences Curriculum Project

This project grew out of a conviction that the curriculum of the American secondary school should be reorganized around a set of "core concepts" which would be taught to all students. These concepts would draw on the content of the traditional disciplines, but would not be presented as a first step toward specialized study. Rather they would introduce all students to the structure, the major ideas, and the methods of inquiry in several broad fields of knowledge. This knowledge, it was held, would be valuable whether or not the student went on to further specialized study in a particular discipline.

As a first step toward realizing this goal, the Project proposed to introduce the behavioral sciences (defined as anthropology, psychology, and sociology) into the curriculum of the Concord-Carlisle High School. This approach was based on several considerations, chief among them the belief that these desciplines represent a vital area of man's knowledge about himself which is almost entirely missing from the American secondary school program.

Beginning in the fall of 1959, a special committee spent several months analyzing and discussing the assumptions and aims of the Project. This group included Concord teachers, administrators, citizens, and university scholars. The general outline resulting from their deliberations was approved by the Concord School Committee, and work on the Project itself began during the following academic year.

A small Project staff was assembled consisting of Dr. Morris L. Cogan, Lecturer on Education and Director of

Secondary School Apprentice Teaching at Harvard; Dr. Robert A. Feldmesser, Assistant Professor of Sociology at Brandeis University and a Concord resident; Merrill A. Needham, a teacher at the Concord-Carlisle High School, with undergraduate training in anthropology; and Mrs. Craig E. Lundberg, a graduate student in sociology at Tufts University.

The first step was to agree on a core concept which would be used as the basis of an experimental course in the behavioral sciences for tenth-grade students. The concept chosen was "behavior is learned." This was felt to be the key to an understanding of human relationships and to the distinctive characteristics of their study in a scientific manner. It was also felt that this concept offered the greatest possibility for further development and for transfer to other areas of understanding. The topic for the first unit of instruction was specified as "The Difference Between Man and the Other Animals." This was considered to be a logical starting point, and one which would afford the best opportunity to demonstrate why learned behavior is so distinctive of and necessary to human beings.

Work then began on the development of specific content for an experimental six-week teaching unit. This unit was divided into three logically sequential subunits: specialization and generalization in the animal world, instinct and learning, and social behavior. Articles and excerpts were chosen from among existing publication in the behavioral sciences, permission to reproduce them was obtained, and the materials were assembled into a book of readings for use by the students. The staff also compiled a list of short texts, novels, and other supplementary reading materials to be used in the unit.

A six-week classroom trial of the experimental teaching unit was conducted in the fall of 1960 with 125 students in the sophomore World Civilization course, which included both college preparatory and general sections. It was found that the available reading materials were too long and difficult for many students, and that the grouping and teaching procedures used were not sufficiently varied to provide for variations in student ability. In general, students appeared to master the key terms and definitions more readily than concepts, although there were those who showed considerable ability in both areas. Audio-visual aids proved both popular and effective, but their use was limited by the scarcity of suitable materials. A project-designed questionnaire administered to all students both before and after the experimental unit indicated only a slight gain in factual knowledge and no change in attitudes—a result to be expected from the difficulty of the readings and the brief period of instruction.

In analyzing the aims and activities of the Project and making plans for the future, the staff concluded that the principle of organizing courses around a "core concept" was already being successfully applied in revisions of the high school courses in physics, mathematics, biology, and other fields. Also recognized was the fact that an enterprise as small as the Behavioral Sciences Curriculum Project was unlikely to have a very rapid or widespread effect on the curriculum of the American secondary school, and that the financial and personnel resources available were insufficient to attempt the development of a full-fledged course. The remainder of the academic year was therefore devoted largely to the preparation of a curriculum guide. This document discussed the reasons for teaching behavioral sciences in the secondary school and presented an outline and list of resource materials for a unit in behavioral sciences, drawing upon and elaborating the experience gained from the experimental unit.

The project staff then proposed that a conference of scholars in the behavioral sciences be held to discuss the desirability of teaching these disciplines in the secondary schools, the concepts which should be included in such instruction, the manner in which this material might be introduced into the curriculum, and the problems of research, curriculum development, and teacher training involved. This proposal was accepted by SUPRAD, and

Prof. Robert A. Feldmesser (standing) discusses the Behavioral Sciences Curriculum Project with (from left) Mrs. Craig E. Lundberg, Dr. Morris L. Cogan, and Merrill A. Needham.

a two-day conference was held at Harvard in December of 1961. Attending were 33 anthropologists, psychologists, sociologists, and educators, most of whom were faculty members from nearby universities. The group also included representatives of the Social Science Research Council, the American Psychological Association, the American Council of Learned Societies, the National Science Foundation, the American Anthropological Association, the American Sociological Association, and the National Council for the Social Studies.

There appeared to be substantial agreement among conference members about the following propositions:

1. To a greater extent than is now being done, high school students should be made aware of the perspective characteristic of the behavioral sciences.
2. Among the components of this perspective are the ideas that: (a) cultures and individuals differ from one another, and cultures often show internal variations as well. Certain problems of both social and personality organization recur, but are solved in different ways. (b) Cultures and individuals are complex phenomena, affected by many forces, external and internal, social and non-social. (c) The individual both shapes his culture and is shaped by it; the actions of each individual affect all who are involved in his culture. (d) Cultures and individuals learn from one another and consequently change over time. (e) The scientific method is one, though not the only, way of studying cultures and individuals.
3. Two necessary elements in conveying the behavioral science perspective are: (a) that the student has at least vicarious experience with the variability of cultures and subcultures; and (b) that the teacher understands the outlook. However, it may *not* be necessary that the student have a course explicitly organized around the concepts of the behavioral sciences: for various reasons, it *may* be preferable that he be exposed to this outlook through, or in connection with, courses in biology, history, or in the other social sciences.
4. Research is needed on the effects of teaching high

school students the behavioral science outlook. Such research must especially take into account the special problems of the adolescent and his sub-cultures, and should involve experimentation with several methods of teaching. Furthermore, the possibility should also be recognized that forces other than formal instruction which are at work in the school culture may either frustrate or facilitate efforts to convey the behavioral science outlook; consequently, research is needed on the total process and outcomes of secondary education.

5. The need for teaching the behavioral science outlook is sufficiently important to warrant further consideration of how it should be done.

Obviously, a curriculum based on these propositions would require a large investment of personnel, time, and money—far more than SUPRAD alone could provide. There is also the question of whether a new organization should be established to pursue further activity, or whether such a venture could operate within the framework of some existing organization. Finally, any further effort at introducing the behavioral sciences into the secondary school should consider the possibility of close integration with other elements of the curriculum.

While these questions have not yet been resolved, one further development should be mentioned. Several scholarly and professional organizations throughout the country have been examining possible secondary school curriculum development or improvement in their fields. One of these is Educational Services, Inc., a non-profit organization which was established to carry on the work of the now-famous Physical Sciences Study Committee in other areas of the curriculum. E.S.I. has become interested in many of the same objectives as the Behavioral Sciences Curriculum Project. As this report went to press, the Project Director and the Chairman of the SUPRAD Administrative Board were among those attending a nationwide summer conference called by E.S.I. to consider the revision of the humanities and social studies curricula. It is clear from this and other developments that increased attention is being paid to a vital and long-neglected area.

Contract Correcting Project

Recently there has been increasing criticism of the inadequate writing performance of the American student. While a number of different reasons could be offered for this failing, one of the most obvious is that students don't write enough. Overburdened English teachers just don't have sufficient time to give to their students.

Most English teachers agree that students should have composition assignments at least once a week if they are to develop clear and effective expression. Unfortunately the typical English teacher faces five classes a day with more than 30 students in each class. A teacher with 150 students who write once a week, and who spends about eight minutes on each theme, puts in more than 20 hours of work each week on grading papers alone. This leaves very little time for lesson planning or other professional activities.

It is also believed that frequent conferences between teacher and individual students are also of great value to the student's progress in composition. If a student can sit down with his teacher and see the why and how of revision, he will generally understand better what his strong points and weaknesses are. His approach to future composition work becomes clearly defined; his progress does not depend principally on the hasty written comments of a busy teacher. Again, the problem is time. Because of the teaching burden, English teachers don't very

often have time for conferences.

Contract correcting, the use of lay readers to aid English teachers, grew out of the assumptions that: (1) students needed to write more; (2) the availability of lay readers would permit a larger number of critical conferences, both between teacher and student and between reader and student; (3) there are in most American communities people who, because of college preparation, journalistic and editorial activities, or former teaching experience, are well qualified to correct high school compositions. Generally these would be housewives who do not want full time jobs outside the home but would be happy to undertake ten or twelve hours each week of work which could be performed at home.

With financial support from SUPRAD and from the Cooperative Research Program, U. S. Office of Education, the Contract Correcting Project was conducted in the high schools of Newton and Concord and in the junior high schools of Quincy, Massachusetts, from 1957 to 1961. Under the leadership of Associate Professor Edwin H. Sauer of Harvard, a committee of school officials from the communities involved set out to find whether or not contract correcting could provide relief for the English teacher and additional writing experiences for the student.

Through publicity and advertisements in local newspapers, prospective readers were informed of the openings and asked to submit to the committee detailed resumés of their training and experience. The response was encouraging; 46 people applied for the six positions at Newton. The candidates were carefully screened by the committee and 20 were selected to attend a two-week workshop conducted by Dr. Sauer. This workshop, and those conducted in 1958 and 1959 for prospective readers at Concord and Quincy, reviewed the mechanics of English usage, the principles of organization, logic and rhetoric in theme writing of an expository and persuasive nature. Instruction and assignments were given in writing and grading themes. Members of the workshop were given an extensive bibliography of works useful to the study of composition.

On the basis of their performance in the workshop, six readers were selected for work at Newton during 1957-1958. These readers were paid $2.00 an hour and were given contracts for 200 hours work during the school year. In later years, at the request of both teachers and readers, readers' contracts were increased to 250 hours. Readers were instructed to spend approximately 180 hours grading papers and 70 hours conferring with teacher and students.

Briefly, the experimental design attempted to investigate two effects: (1) the direct influence of the reader on the students' writing performance and (2) the extent to which teachers felt that teacher-relief afforded by the program was significant. In general, the same procedure with some variation was used in the three communities involved. Students aided by a reader and other students of comparable intelligence not aided by a reader were asked to write impromptu themes in the fall and spring on comparable topics. The committee hoped to learn whether the reader helped or hindered the students' writing growth.

At the end of each year, teachers and readers were asked to write detailed reports dealing with their impressions of the project, its good and bad features, and the wisdom of introducing it in other communities. In addition, readers were asked to keep and submit to the committee detailed records of the kinds of writing assignments they corrected and the amount of time spent in grading these assignments. Questionnaires were circulated among the students involved in the project and among their parents.

For the most part, teachers aided by contract correctors were extremely enthusiastic about the project. At first, as might well be expected, teachers were reluctant to permit their readers to do anything more than correct obvious mechanical errors in themes. Reader-corrected themes were not handed back to students until the teacher had carefully checked each paper. With time, however, teachers became more confident and after six or

seven months, they began to return papers to students directly from the reader. One teacher remarked:

> *Personally, I found the Program an immense help. Mrs.— gave the papers far more careful scrutiny than I would have had the time to give. Due largely to her perceptive comments and guidance, there was a marked improvement in students' writing during the course of the year. The Program also saved me a tremendous amount of time which I was able to devote to more careful class preparation. Thirdly, I think that the corrector can be more objective in marking the student's work.*

Numerous comments by teachers indicated the usefulness of reader-student conferences. In general, teachers felt that their students wrote more and indeed were more concerned with their writing than they had been in the past. Yet with this increased writing and increased attention to the writing problems of students, teachers stated that they had a good deal more time for planning lessons, professional improvement and even relaxation than in previous years.

This is not to say that the working relationship between teacher and reader was completely effective and smooth-running from the outset. Reasonable evidence has been given, both in teachers' comments and in the impromptu theme results, to indicate that during the early months of the relationship, a reader tends to "get in her teacher's way." Both teachers and readers felt that it took some time before they worked well together as a team. Taking this hint from them, the committee was careful to keep teacher-reader teams together over a two- and, wherever possible, a three-year period.

Impromptu theme results from the first year's testing at Newton were disappointing. The group involved were college-bound juniors and seniors. Neither the experimental groups aided by a reader nor the unaided control groups showed significant gains in writing skills. Many students wrote less well in the spring testing than they had in the fall. The low scores by so many groups in the experiment led to a search for an explanation outside the Contract Correcting experiment. The one that occurred immediately was that the spring impromptu themes were given much too late in the school year; students had been deluged with tests; and seniors, most of whom had received college acceptances, or at least assurance of graduation, had stopped working. The only groups that did not show losses were composed of juniors whose high school work was not finished. The inconsistencies in the test results could thus, to some degree at least, be attributed to the test design itself, which failed to take into account a typical pattern of student behavior. In the following years, student impromptu themes were written very early in the spring.

Test results from Newton for the years 1958-1959 and 1959-1960 showed certain consistencies which were encouraging. Readers seemed to be most effective when they worked with college preparatory students. Sophomores, juniors and seniors in this category who were aided by a reader were writing better at the end of a year than comparable groups which received no such aid. Although the non-college preparatory seniors in the study did not appear to profit greatly from the assistance of a corrector, the evidence is neither completely consistent nor conclusive.

College preparatory freshmen and seniors were included in the Project at Concord during 1958-1960. Test results for the first year indicated that both the experimental and control groups showed improvement in the spring; the performance of the experimental group was slightly superior to that of the control group. Results from the second year at Concord showed the experimental groups to be writing far better than the control groups in the spring.

To test the effect of contract correcting in the junior high school, readers were used at Quincy for seventh, eighth and ninth graders of low, medium and high intelligence. The test results for the first year were inconsistent. Of the seven high intelligence experimental classes, four showed significant gain in scores. Of the two

Mrs. Margaret Guindon, a contract corrector, talks with Concord-Carlisle senior Doris Austin about her English composition.

experimental classes of low intelligence, one showed gains. Most noteworthy in these results was the fact that *all* of the control groups showed gain scores while six experimental classes showed little or no gain. Results of the second year's testing, however, indicated a dramatic improvement. Nine of the ten experimental groups, including all six high intelligence classes, showed significant gains. Only one of the five control groups did so, and this was a ninth grade class of low intelligence. This seems to indicate that when lay readers are new to a school system they are unable, in most cases, to become effective immediately.

It is probable that the inconsistencies which occurred in the 1957-1958 Newton test results reflect this same phenomenon. It is difficult, therefore, to determine the effectiveness of contract correcting after it has operated for only one year in a community.

Students were most enthusiastic about the project. In their responses to questionnaires they mentioned particularly their approval of the reader-student conferences. One boy said, "I am in favor of the Contract Correcting program because the corrector got to know me very well and was able to get down to the fine points and give me a good working over." Students agreed that the reader made them more aware of their major errors than they had been previously and that this was most helpful. Except for three classes belonging to one teacher, the vast majority of students in all intelligence groupings responded favorably to the idea of contract correcting.

On the negative side, one reader did not seem to make a hit with her students. Pupils in the three classes for which she read responded ten to one against the project. Interestingly enough, an analysis of the impromptu themes showed that these students had the highest degree of improvement over the year of all classes involved in the Project.

The committee circulated questionnaires among parents whose children were served by readers. A number of

parents noted that their children had more writing assignments than in previous years; most parents who replied stated that the idea of reader-student conferences seemed useful. When asked about the disadvantage of the program, most parents could think of none and urged the continuation of the project. One mother did object: "I feel if a teacher is to help a child she must look over work carefully herself. How else can she see what group and individual errors exist?"

Students do not appear to suffer from the attentions of their readers; in many cases these students are writing better than their peers who are not served by readers. Communities investigating the usefulness of lay readers should be aware that the reader not only can bring to the students a specific knowledge of appropriate and effective expression, but also she can bring new ideas to the student and the school. Readers involved in this project have been well educated women who have helped to infuse the schools with that intellectual vitality upon which students may thrive. In a sense, through their lay readers, the communities involved have contributed in a more than material way to the prosperity of their schools. At the same time, some of the burden under which teachers of English have traditionally worked has been removed.

A lay reader program cannot be expected to function with complete efficiency from its outset. It takes time—perhaps six months, perhaps a year—before teacher-reader teams become really effective. And once having been established such a program should not be left by those directing it to fare for itself. For the first year at least there should be supervision to insure the proper functioning of the program.

The expense involved is not high. If four readers are hired, given contracts for 250 hours each, and paid $2.00 an hour, the outlay by the school system will be about $2,000. Add to this the cost of a workshop and what few supplies are needed, and the total expense for a year's operation is about $2,400. If each reader serves 150 students, the cost per year per student is less than $4.00.

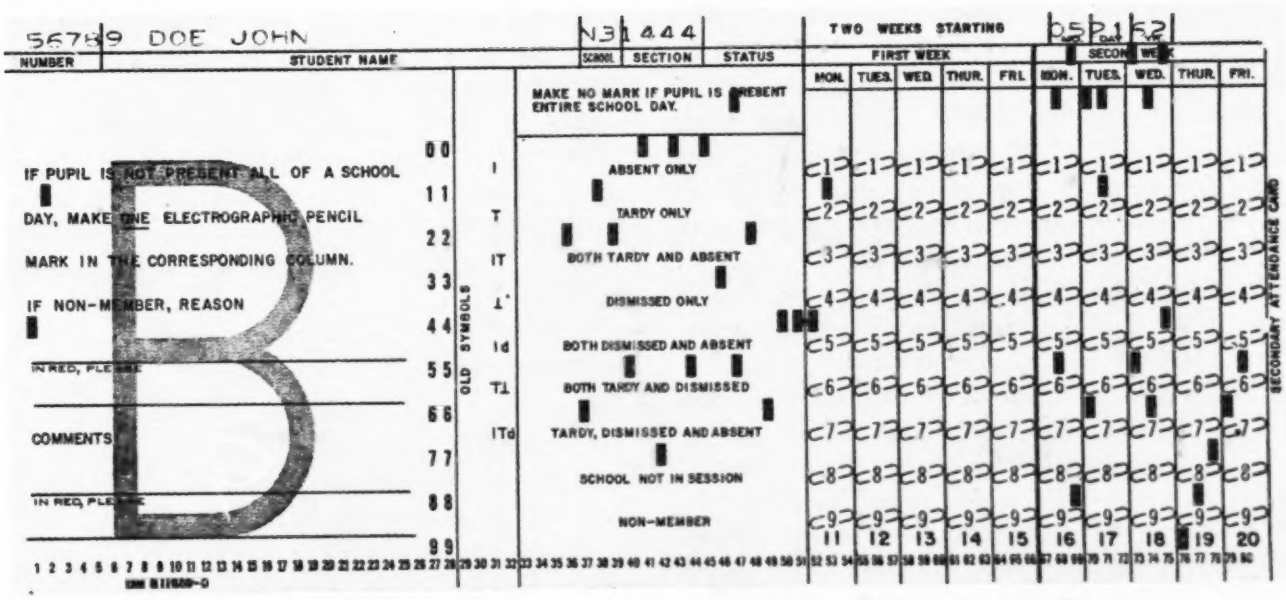
Recognition of the value of contract correcting has been demonstrated by the fact that two communities, Newton and Concord, have adopted this system as a regular feature of their high school English programs.

Data Processing Project

During the past decade, the development and use of high-speed computers and other data processing equipment has accelerated sharply. Business, industry, the military, and government agencies have increasingly used this equipment to store and process enormous amounts of information quickly and accurately for a wide variety of purposes. Colleges and universities have greatly extended their use of computers for research and development as well as for more practical purposes. Until recently, however, public school systems have been considerably slower to adopt this rapidly developing new technology.

The SUPRAD Data Processing Project began in 1961 as an effort to investigate existing uses of educational data processing, develop and test new and promising applications of this technology to educational problems, and distribute the resulting information to public school systems in New England. It is sponsored jointly by SUPRAD, the New England School Development Council, and the Newton Public Schools.

Data processing systems have already proven extremely effective in handling many types of basic information used by all public school systems. The Newton Public Schools, for example, use data processing meth-



This punched card, used to record pupil attendance, shows one of the many possible uses of data processing equipment in education.

ods for the collection, storage, and processing of such information as the school census, attendance registers, homeroom assignments, report cards, class rosters, and the scoring and analysis of standardized tests. But the possibilities of data processing systems are not limited to these relatively routine functions. Researchers in the field foresee the use of this equipment to speed and improve a number of other aspects of the educational process, ranging from the scheduling of high school classes to the use of computers as "teaching machines."

A data processing system can thus provide larger amounts of information of more different kinds than is otherwise available, and can free the time of human beings to do the kinds of things which only humans can do.

Data processing systems vary from the relatively simple type using punched cards, sorting machines, and tabulators to the more sophisticated systems which include high-speed computers capable of performing thousands of intricate calculations in seconds. Educational data processing is increasingly evolving toward computer-based systems which are infinitely faster, more flexible, and capable of performing a far wider variety of operations.

Contrary to many popular misconceptions, the use of data processing equipment involves considerably more than simply pushing the button and letting the machine do the work. In order to make proper use of this new technology, large amounts of information must first be put into a form in which it can be handled by machine. This involves the development of uniform methods for collecting accurate information and storing it on punched cards or on magnetic tape; the training of school personnel in the theory, operation, and potential of data processing systems; and the development of the necessary computer programs—sets of operating instructions in the "language" of the computer which make it perform the desired operations. All of these steps require early investments of time, money, and talent. Once the preliminary "tooling up" is completed, the machine can perform at high speed a wide variety of operations which

would ordinarily require too much time to be done by hand.

The SUPRAD Data Processing Project has devoted most of its first year to the investigation of data processing techniques and developments throughout the country; the development of computer programs for use in its own activities; the exploration of possible new data processing devices; and research on the problem of school scheduling. This last point illustrates one area in which data processing can speed and improve an important aspect of the educational process.

Developing a master schedule of courses and class meeting times for a medium-sized high school can require as much as two months of work by a highly trained school administrator—time which could otherwise be spent on educational planning, staff training, curriculum development, or other vital concerns. The assignment of pupils to individual classes from this schedule, with a minimum of conflicts between course choices, can also be a time-consuming task. The SUPRAD project has worked first on the problem of pupil assignment, resulting in the development of a punched-card system for catching conflicts in course assignments and for assigning pupils to study halls. Also developed were computer programs for producing a "cross-tally" of potential conflicts in pupil course selections. Using an IBM 709 computer, these programs have produced cross-tallies for a high school of 2,100 pupils, selecting from among more than 200 courses, in one and one-half minutes.[5]

Also under investigation has been the use of a computer to develop the master course schedule for a high school; the development of optical scanning equipment which will translate written characters directly into machine-readable form without the use of punched cards; and the possible use of computers as a teaching tool in high school mathematics and in programmed instruction.

Future plans for the project include activity in the following areas:

1. Research and development on computer-based systems for scheduling, test scoring and analysis, and in such areas as pupil records, financial accounting, and programmed instruction.
2. Service to school systems through the development of a regional data processing service center in which two or more public school systems would participate.
3. The development of appropriate instructional programs in educational data processing at both the school and university level.
4. Dissemination of information about educational data processing and its use by public school systems.

[5] Information about these programs is available from NESDEC, 475 Broadway, Cambridge 38, Massachusetts.

Junior High School Grouping Project

Classroom teachers are all too familiar with the wide range of ability and achievement among pupils of the same theoretical grade level. This "ability spread" increases steadily as they progress through the elementary grades, and is markedly noticeable by the time they reach junior high school. How can the school cope with such a wide range of abilities and still provide appropriate instruction for the entire group of pupils with which it is entrusted? The Newton Junior High School Grouping Project has addressed itself to this question.

Aims and Problems

The Project began in the fall of 1958 in the Day and Meadowbrook Junior High Schools with a total enrollment of 1327 pupils in grades 7 through 9. After its first two years of operation, formal research in the Project was limited to the 630 pupils in Day Junior High School, although Meadowbrook continued to follow similar patterns of organization and operation.

More detailed objectives of the Project included the following:

1. To raise the achievement standards of students at all points on the ability scale, and particularly those who deviate from the norm.
2. To identify students who rightfully belong in the various academic groups created.
3. To select those students with exceptionally high aptitude, ability, and interest in mathematics and science and to prepare them for advanced studies programs in high school.
4. To design a schedule which will permit the wide range of flexibility required by such a program. Specifically, it was proposed to free the teacher from the standard 40-minute, 30-pupil arrangement and reassign him according to his particular talents and the diverse requirements of the program.

In pursuit of these aims, pupils were arranged in academically homogeneous groups for instruction in science, mathematics, and basic skills in English (composition, reading, and literature). Heterogeneous grouping was used for instruction in social studies, physical education, certain aspects of English, and the common learnings content of art, foreign languages, music, home economics, and industrial arts.

The Project discovered that it must grapple with several basic questions. Among them were the following:

1. What is the rationale and purpose of instruction in the various groups, and what curriculum materials and instructional procedures would best contribute to these purposes?
2. What criteria should be used to select students for assignment to the most appropriate groups?
3. How could the special competence of teachers be analyzed and used most effectively?
4. What kinds of time schedules and course programs would be most helpful in realizing the aims of the Project?

Grouping in English

The Project built on an existing arrangement under which pupils in all three grades were assigned to so-called English—social studies—guidance groups (ESG). These groups, consisting of between 25 and 30 pupils, had been organized heterogeneously in order to teach English and social studies in combination, and also to enable teachers to know well a comparatively small group of pupils. This practice was continued as a part of the Project. In most cases, ESG teachers are assigned two groups of this type. This means that the ESG teacher works with a total of 60-65 pupils instead of 120 or 130 whom he previously met during the course of a week. A total of eight hours per week is alloted to ESG instruction.

In addition, pupils were scheduled for two hours of instruction per week in "English skills" groups on a homogeneous basis. These groupings have gone through several changes during the history of the Project, evolving into the following four patterns (in each case, the subject mentioned first is emphasized):

C-L—composition-literature
L-C—literature-composition
C-Dr—composition-developmental reading
Dr-C—developmental reading-composition

These three pupils may differ widely in abilities and needs. The Newton Junior High School Grouping Project has explored various ways of meeting these differences.

Pupils in these skills groups are chosen on the basis of Sequential Tests of Educational Progress (STEP) in reading and writing. Generally, the C-L group is chosen from pupils above the 50th percentile on the reading tests and above the 75th percentile on the writing tests. The L-C group is chosen from pupils scoring above the 50th percentile in both tests but below the 75th percentile in writing. The C-Dr and Dr-C groups are made up of pupils scoring *below the 50th percentile on both tests, with* the group assignment depending on the higher of the two scores. For example, a student scoring above the 30th percentile in reading and in the 20th percentile in writing would be assigned to the Dr-C group. A student scoring in the 20th percentile in reading and in the 30th percentile in writing would be assigned to the C-Dr group. These relationships are shown in the following table:

Group Assignment	Reading Score	Writing Score
C-L	Above 50th percentile	Above 75th percentile
L-C	Above 50th percentile	Above 50th percentile but below 75th
C-Dr	Below 50th percentile, but lower than in writing	Below 50th percentile, but higher than in reading
Dr-C	Below 50th percentile, but higher than in writing	Below 50th percentile, but lower than in reading

It will be seen from the above that assignment to the English skills groups are made according to the pupil's strength rather than according to his weakness. This is a departure from the usual assignment procedure in this type of program, the theory being that the strengthening

of a skill which is already relatively strong will result in a strengthening of the weaker skill also. During their two hours of weekly instruction in these skills, the pupils are taught by ESG teachers who have been assigned to the skills groups on the basis of their instructional strengths.

Science

Pupils are assigned to science classes on a homogeneous basis, the selection being made by the science teachers on the basis of STEP science test scores, previous teacher's recommendations, and previous course grades. In general, this has resulted in the division of science pupils into three groups: high, middle, and low. In some cases, there is also an advanced group which includes pupils of extremely high ability.

Mathematics

At the start of the Project, mathematics groups were formed on a homogeneous basis in much the same way as those in science. Since then, the school has begun to participate in two nationwide mathematics programs: the University of Illinois Commission on School Mathematics Program and the School Mathematics Study Group Program. These two special programs have necessarily had some effect on the original grouping procedures envisioned by the Project, and the selection of pupils has been tempered by the requirements of the two programs. The similarity in grouping procedures between mathematics and science, therefore, decreases to some extent in Grade 8 and is tempered even further in Grade 9 when pupils begin to make their own elections in mathematics. The basic idea of assigning pupils to homogeneous mathematics groups still remains, however. At present there are three homogeneous mathematics groups in Grade 7, with an increasing diversity in Grades 8 and 9.

Some Sample Groupings

These grouping practices result in the instruction of pupils in two types of situations: in heterogeneous groups which are arranged as nearly as possible to include a cross-section of the school population; and in homogeneous groups to which pupils are assigned on the basis of their strengths and needs *in each individual subject*. This means that a given pupil may not necessarily be grouped at the same level in all subjects. He may, for example, be in a high-level group for mathematics and a low-level group for English skills.

Scheduling

One of the most important and difficult tasks in the Project was the development of a flexible schedule which would accommodate the diverse elements of the overall program. With the permission of the Newton School Committee, the school day was lengthened by nearly one hour and the basic scheduling pattern was drastically changed. Instead of the former arrangement of six classroom periods of 42 minutes each, the schedule was arranged into twelve blocks of 30 minutes each. This permitted the scheduling of instruction for lengths of time ranging from 30 minutes to two hours, depending on the nature of the subject, group, and instructional aims involved. As the schedule has evolved in practice, ESG classes have ranged from 30 minutes to two hours in length, with most lasting one hour. Classes in other subjects have usually run for two consecutive 30-minute

blocks. The schedule has also provided many times during the regular school day for other activities such as clubs, musical activities, staff meetings, and individual counseling. These are conducted in three one-hour periods during the week which are set aside as "laboratory periods."

Curriculum Guides and Workshops

During the first two summers of the Project's operation, special curriculum guides were written and placed in use in the various English skills groups. Special materials were also produced for use in the various science and mathematics groups. These materials have been continually revised and replaced ever since. In mathematics, for example, the introduction of the new modern mathematics programs has virtually eliminated the use of the materials developed for that subject.

During the past two years, teachers in each area of the school program have attended workshop sessions every other week to discuss problems connected with the grouping project in their particular areas and in the Project as a whole. These workshops have dealt with such problems as further development of the concepts and skills which classroom teachers need to carry out their roles in the Project; development of more precise criteria for the assignment of pupils to homogeneous groups; and evaluation of the various aspects of the Project as a whole.

During the past school year, workshops have consisted largely of visits by guest speakers both from within and outside the field of education, with an opportunity for discussion with these people for part of each workshop session. From time to time, open sessions have been provided to discuss and evaluate the impact of these speakers.

Consultant Services

Consultants for the Project have come principally from the Newton Public Schools and the Harvard Graduate School of Education. Newton consultants have worked in the fields of reading, communications, science, mathematics, foreign languages, industrial arts economics, curriculum development, and evaluation. Worcester has provided consultants in the fields of reading, composition, science, statistical procedure, and evaluation.

Harvard has also had other relationships with the school staff. These have included the assignment of Harvard apprentice and intern teachers and practice counselors to the school; the use of students in the English teacher training program at Harvard as aides to teachers in the English Skills classes; and the collection of research material by Harvard doctoral candidates through the cooperation of the school's administrative and teaching staff.

Evaluation and Further Study

Formal research in the Junior High School Grouping Project was completed at the end of the 1961-62 academic year. Evaluation of the Project will include measurement of pupil learning gains in the various kinds of groups, and surveys of teacher and student attitudes toward the Project. A classroom observation instrument has also been developed which, it is hoped, will help to determine at least two things about the Project:

1. Whether the grouping procedures, the curriculum guides, and the scheduling system have enabled teachers to differentiate instruction among various ability groups.
2. Whether the results of these observations can be

used to develop a program of in-service teacher training to meet the classroom demands posed by the Project.

The evaluation will also deal with several aspects of the Project which, while not as easily or precisely measurable as the above factors, are of equal importance and interest. They include the rationale for the kinds of grouping and curriculum procedures employed; an examination of the bases of group selection and scheduling; and an examination of the school-university relationship as it has affected and as it has been illustrated by the Project.

The MPRAD Administrative Board has also authorized a one-year further study of the Project which will include such topics as the following: the existing school organization, program, and school-university relationships when the project began; the goals of the project, and what was done to reach them; the degree to which these efforts were successful and how they affected the school, its personnel, and the school-university relationship; and the implications of the Project in a broad sense for junior high school education.

Language Laboratory Project

The Language Laboratory Project began in the summer of 1957 when Miss Elaine M. Hardie, an experienced teacher of French at Concord High School, received a grant from MPRAD to study the use of language laboratories at various foreign language teaching centers in the United States. Her purpose was to investigate whether the language laboratory, with its mechanical aids such as tape recorder and individual listening and recording booths, would be a useful aid in improving students' speaking ability and understanding of spoken French without damage to their achievement in the written aspects of the language. With the help of MPRAD funds, a language laboratory was installed in the Concord High School.

Essentially, a language laboratory is intended to help the student acquire facility and accuracy in spoken language through the presentation of speech models for imitation and by providing for comparison between the student's efforts and the model presented. It also presents various types of imitation, repetition, and pattern practice and variation drills. For example, the student may be asked to change a series of present tenses to future tenses, or to transform a series of statements into certain kinds of questions, with the model voice supplying the correct answers for comparison. The student listens through headphones to the laboratory lesson, which is integrated with the regular classroom and textbook work. He attempts to imitate the tape-recorded model voice of a native French speaker, and records his efforts on a tape or disc. He can then compare his own recorded work with the model voice and correct errors in pronunciation, intonation, or grammar. Through the master control console the teacher can listen to the students' efforts and provide help and correction.

In the Concord project, the regular French teacher was assigned a French-speaking laboratory assistant to help her in operating the laboratory equipment, building a library of tape-recorded speech models, and monitoring the pupils' performances and giving individual assistance where necessary. During a typical French period, each half of the class took turns working in the laboratory while the classroom teacher worked with the rest of the students on the informative and interpretive aspects of the day's lesson.

The Language Laboratory was integrated into the three-year program of foreign language instruction at

Miss Elaine M. Hardie, Concord-Carlisle High School French teacher, listens while a student works on pronunciation in the language laboratory.

Concord High School, with emphasis during the first two years on intensive practice in listening comprehension and oral use of basic speech patterns. In the third year, the student continues to improve on the basic oral skills and is introduced to a larger amount of reading material of literary and cultural value. The three-year program is therefore designed to emphasize the four objectives of listening, speaking, reading, and writing.

Evaluation of the Project

Before the Project began, Concord High School students were already taught French by the audio-lingual method which emphasized listening, speaking, understanding, and good pronunciation. The laboratory offered an opportunity for even more practice in these areas. Accordingly, the first group of students to use the laboratory regularly (the experimental group) was observed and compared with the previous year's students who used it little or not at all (the control group).

No objective tests of speaking ability were available. However, observations of student performance indicated that the use of the laboratory caused an improvement in this area, especially in proper accent. Formal testing was intended both to measure the laboratory's effects in other areas and to find ways of improving its use.

Tests of listening comprehension and comparisons of teachers' course grades showed a slight superiority for the experimental group, but this difference was not statistically significant. In tests of reading ability, the control group was slightly superior, but not significantly so (it should be noted that the control group did more reading in French than the experimental group). In vocabulary and grammar tests, the control students did signifi-

cantly better than the experimental students, although the differences involved were not extremely large.

Interviews with students using the laboratory showed that the majority liked it or expressed confidence in its value as a learning aid. Increasing experience or familiarity with the laboratory, if it had any effect, increased their liking for it and increased their desire to study foreign languages. Some students were disturbed by the limited use of textbooks during laboratory sessions, by the fact that they could not control the rate of presentation of taped materials, or by the repetition involved in the laboratory work. (Newer laboratory equipment now permits the student to control the presentation and repetition of material according to his ability).

After two years of experimental operation, the language laboratory was continued by the Concord Public Schools as a part of its regular high school instructional program in foreign languages. A language laboratory was also included in the new Concord-Carlisle High School, which opened in September of 1960. This laboratory was at first used for instruction in Russian as well as French. However, with the increased interest and enrollment in foreign languages, a second laboratory was installed early in 1962. This laboratory is presently used by Russian and Latin classes, while the original laboratory is used exclusively for French.

Programmed Instruction in Junior High School Mathematics

In recent years, educators have become increasingly interested in the possibilities of programmed instruction as a means of making learning more efficient. One small but significant SUPRAD project has been an effort by Paul G. Dickie, a Concord Junior High School teacher, to develop programmed instruction materials in junior high school mathematics.

Programmed instruction is a method of presenting material to the learner in a controlled way, through a carefully arranged sequence of small steps. This series of steps—questions, matching tasks, or other material on which the student must act—is called the program. Although it is frequently used in a so-called "teaching machine," it can also be presented without machinery through the use of simple masking devices or in the form of a programmed textbook. The most important principles of programmed instruction, drawn chiefly from experimental psychology, are (1) that the learner must make an active response to each item in the program; (2) that he must receive immediate confirmation of his response; and (3) that the material must be presented in a carefully controlled sequence which leads him gradually to mastery with a minimum of errors. Most of the basic research on these principles, and their application to human learning, stems from the work of Professor B. F. Skinner of the Harvard Psychology Department.

Mr. Dickie's project grew out of an earlier effort to develop supplementary materials for independent study by talented students in mathematics. These materials were produced in the form of printed work sheets on selected mathematical topics, including instructions to the student, which could be used for further study after completion of the regular daily class work. They proved so interesting and successful that Mr. Dickie became interested in developing materials which would be self-correcting as well.

In 1959, Mr. Dickie received a small SUPRAD grant to familiarize himself with the literature, theory, and

PROPORTION C - 1 WAYS OF READING PROPORTIONS

1. Look at the proportion 2/4 = 3/6. Notice that 2 is half of 4 and that 3 is half of ____.

6

2. In the proportion 2/4 = 3/6, we can say that 2 compares to 4 exactly the same way that 3 compares to ____.

6

3. Look at the proportion 6/2 = 12/4. We see that 6 is three times as big as 2 and that 12 is also ____ times as big as 4.

3

4. In the proportion 6/2 = 12/4, we can say that 6 compares to 2 in the same way that ____ compares to ____.

12...4

5. In the proportion 6/2 = 12/4, instead of saying "6 compares to 2 the same way that 12 compares to 4" a shorter way would be to say "6 is to 2 as 12 is to ____."

4

6. A shorter way of stating the proportion 2/4 = 3/6 is "2 is to 4 as ____ is to ____."

3...6

This fragment of a programmed unit in junior high school mathematics is used with a simple masking device which covers the correct answer until the pupil has given his own.

techniques of programmed instruction, and to begin the production of programmed materials in junior high school mathematics. The result was three programmed units in Pythagorean Theorem, indirect measure, and proportion, which were tested with seventh and eighth grade students at the Concord Junior High School. The materials were revised on the basis of this trial and administered again during the following year.

Results of the first year's trial were encouraging. Students using the programmed materials learned as much as those who were taught by regular classroom instruction, and did so in approximately one-fourth the time. They used the programmed units entirely by themselves, requiring virtually no attention from the teacher.

Analysis of the results with the revised materials showed that they produced only slight improvement over the original materials. More important, it was felt that a much more rigorous analysis of the subject matter would be required in order to discover the precise pupil responses needed for successful learning with the programs. In view of the traditional nature of the topics involved, Mr. Dickie concluded that such an investment of time and effort could not be justified.

Mr. Dickie now heads a project, sponsored by the recently established Harvard Committee on Programmed Instruction, which is exploring a rigorous logical analysis of parts of the behavior of "knowing" mathematics preparatory to programming materials in this field.

Other Related Activities

SUPRAD has also either sponsored or encouraged other investigations of programmed instruction during its five years of existence. Within the Team Teaching Project at Lexington's Franklin School, experimental work has been done involving the use of teaching machines and programmed instruction in spelling, reading, and elementary mathematics. These projects have been either exploratory or are in too early a stage to report any conclusive results.

Social Studies Project

(Teaching High School Students a Critical Approach to Contemporary National Issues)

This project began in 1957 with support from SUPRAD and the Cooperative Research Program, U. S. Office of Education. It was housed at first in the Peter Bulkeley Junior High School, moving to the Emerson Junior High School in September of 1960 when its students were transferred to that building. An important characteristic of this project is the fact that it involved cooperative efforts at research, teaching, and training by a faculty member from the Graduate School of Education; graduate students from various faculties in the University; and Concord classroom teachers.

Major Objectives

The major objectives of the Project were (1) to develop an appropriate thought process model which, when used to teach high school students, will give them the skills required to analyze current political issues critically and intelligently, (2) to develop effective methods and procedures for presenting current issues and evaluating the presentation, and (3) to investigate the relationship between personality attributes, academic ability, and a student's ability to apply the basic principles of the analytic model to contemporary issues. The Project also involved the development of a considerable body of teaching materials. These included substantive "problem" units (i.e., school desegregation, business competition, Federal loyalty-security programs); units presenting a political and analytic framework by which these problems might be attacked; and a large number of case studies involving conflicts between basic issues.

The project involved five experimental classes in Concord and control groups in three other school systems. Each experimental group included approximately 25 students, half of whom were taught by the so-called "Socratic-analytic" method and the other half by a "recitation-analytic" method.

Experimental Teaching Materials

Materials for teaching the thought process model were developed and revised twice for use with students in the experimental groups. Substantive problem units were developed on such topics as School Desegregation, Business Competition, Labor-Management Practices, The New Deal, and Federal Loyalty-Security Programs. A number of short cases were also added to the teaching treatment dealing with two topics that are ordinarily covered in junior high school American history texts (the American Indian and immigration). The experimental curriculum as a whole thus included materials running from the American Revolution to the Federal

Loyalty-Security Program which can be inserted into a conventional American history program.

As a result of writing case materials on conflicts of governmental and legal values, and attempting to use these cases as teaching vehicles, the Project staff developed the following classification of these values.

SUBSTANTIVE RIGHTS

Personal Freedom (Speech and conscience; association; property and contract)
Equality
Brotherhood
General Welfare
Peace and Order

PROCEDURAL RIGHTS

Rule of Law
Equal Protection Under the Law
Rule by Consent
Due Process
Separation of Powers
Checks and Balances
The Federal System

Teaching of Experimental Materials

A set of analytic concepts was taught to 125 students in the experimental groups in Concord. Each of the five experimental groups in Concord was split into two matched sections on the basis of pretest scores in critical thinking, I. Q., and level of participation. Experimental units were taught to these groups in sections. Classes were tape recorded to pretest students' ability to handle material presented in threatening and non-threatening form, and also to test the adequacy of systematic observation techniques. Two cases were presented through the Socratic method (Boston Tea Party and Cuban Revolution). Two cases were presented in leaderless fashion (Eminent Domain Case and China Revolution).

A unit was then taught on the major principles of American government. A series of cases was used to teach the necessity of government and the danger of abuse of power when government is not properly controlled.

Each of the ten experimental groups in Concord was presented with four cases involving conflicts in governmental or legal values to be discussed in two class periods (approximately 80 minutes) without teacher assistance. The groups were then treated for ten class periods, during which ten similar cases were presented. Five groups were taught by Recitation-analytic discussions and five groups by Socratic-analytic discussions. After ten days of treatment, the groups were again required to discuss four cases, similar to the pretest cases, without assistance from the teacher. This completed the work of the first year of experimental teaching.

A second series of two leaderless discussions was conducted in all experimental groups in Concord, as well as with six control groups, in the fall of 1960.

In the second year, six substantive units were taught. At the end of each unit, the students were tape recorded in a leaderless discussion to be used for evaluation.

Experimental Teaching Styles

Considerable time and effort went into the development of theoretical and operational distinctions between the Socratic and Recitation methods used in the experimental teaching. A short study was conducted to test the reliability and validity of a systematic observation procedure in differentiating these two teaching styles. Results of this study were encouraging, and the Project staff arrived at the following distinction: the Socratic, while it does tend to engender more affect and recognition of

Harvard professor Donald W. Oliver (standing) and Concord social studies teacher Leonard A. Godfrey, Jr. lead a junior high school class in a discussion of conflicting claims.

self-contradiction, is basically characterized by a sustained period of interaction between individual students and the teacher, during which the student is forced to put several components of thought together into a *gestalt*. Affective outbursts and self-contradictions are by-products of the student's new perceptions of the broader implications of his longer discourse. The recitation style of teaching, while it may carry the whole class (and the teacher) through an identical thought process, does not force an individual student to think through by himself his own position. From the student's point of view, the recitation style appears as fragmented bits of a larger thought process, which he is never forced to handle as a unit.

While this conceptualization made distinct progress, it was not sufficiently operational to tell the teacher explicitly what to do in order to maintain consistent differences between the two teaching styles. Consequently, a fairly standard lesson plan was developed which directs the teacher in how to lead the students through the thought process model in straightforward recitation fashion. The Project staff now feels that the distinction between the two styles lies not only in the fact that the Socratic teacher is forcing a single student to focus on complex elements of a thought process, but also that the Socratic teacher is focusing upon the intellectual behavior elicited from the *student* through Socratic questioning. In the recitation, the teacher deals only with parts of the total intellectual model. Furthermore, these parts are "told" to the students and then the students are asked to recite them back. The focus is on intellectual behavior demonstrated by the teacher, which the student is to imitate.

One interesting point in this connection is that the

recitation groups seem to apply the thought process model as well as do Socratic groups—if we accept the intuitive judgments of the teacher. The most important variable operating with all groups seems to be *making the thought process model explicit* somewhere in the teaching treatment. This, of course, is done with both groups.

A second interesting discovery was that the effort to define the teaching treatment operationally brought many new insights into the intellectual operations which the Project was trying to teach the students (the thought process model). Continually asking oneself, "What questions do I ask the student in order to teach *X*?" forces one to define *X* with a high degree of precision.

Testing

Early in the experimental period, a group of pencil and paper achievement tests were administered to 125 students in experimental groups in Concord and to approximately 400 students in control schools. These tests were scored early the following year. The achievement testing program involved the administration of the complete battery of learning outcome measures in the fall of 1959 and the spring of 1961 to both experimental and control groups.

As part of the Project, a doctoral student (Mrs. Lauren Resnick) carried out a study, under the direction of Dr. John B. Carroll and Dr. Donald W. Oliver, the Project Director, to identify measures of cognitive style and cognitive need. This study was helpful in making a final selection of measures of cognition which might predict variance among students in the kinds of learning outcomes the Project was trying to effect. A number of personality measures were also administered to the experimental groups. These included two standard temperament or trait batteries (Cattell's HSPQ and the Guilford-Zimmerman Temperament Survey), a number of attitude measures, and measures to get at cognitive need and cognitive style.

Since the Project staff felt that changes in oral behavior are more likely in this type of instructional program than changes on pencil-and-paper measures, a standard interview was administered to all experimental subjects in Concord, and to a group of control subjects. A rough scheme for scoring these interviews was developed and refined, and the interview data were scored.

As mentioned previously, the observation system used to identify differences in teaching style was developed and extended to yield a more explicit distinction between the Socratic and Recitation styles. Work was also done on developing a content analysis for the evaluation of tape recorded class sessions.

Summary

In the third year of operation, it was possible to follow the experimental teaching pattern using a virtually complete set of teaching materials developed by the Project. The following summary of the curriculum and testing program for Grades 7 and 8 shows the units and procedures:

SEVENTH GRADE

1. The Age of Exploration (the Crusades and Columbus)—from regular text
2. Pretest achievement battery
3. Teach analytic thinking model, including short illustrative cases
4. The American Revolution (regular and Project materials)
5. American Government: a political-legal model of

problem analysis (a Project unit)
6. Recording of discussion for evaluation: 10-day treatment
7. Post-test (partial achievement battery)

EIGHTH GRADE

1. Pretest (partial pencil-and-paper achievement battery); interviews; leaderless discussions
2. Desegregation in the Schools (Project Materials)
3. The American Indian (regular and Project materials)
4. Business Competition (regular and Project materials)
5. Labor-Management Practices (regular and Project materials)
6. Personality test battery
7. Immigration (regular and Project materials)
8. U.S. History, 1900-1925 (regular materials)
9. New Deal (Project materials)
10. World War II (regular materials)
11. Post-test (full achievement battery)

The Project staff is now working on its final report, which will include the following topics:

1. Criteria for the selection of content in the social studies, including a justification for the emphasis upon the teaching of contemporary political issues.
2. A consideration of the nature of values in American society and their importance in the development of an intellectual framework for clarifying and debating political issues.
3. The presentation of a political-legal-analytic model for clarifying and teaching political issues:
   a. the ethical component of the model
   b. the political component of the model
   c. the analytic component of the model
   d. problems in the model which limit its usefulness or make it inappropriate.
4. The organization of materials of instruction according to the political-legal model. Two sample units of instruction: Racial Desegregation in the Schools and Labor Relations.
5. The analysis of styles of teaching appropriate for teaching students to clarify political issues:
   a. An experiment in the manipulation of teaching style
   b. The quantitative description of teaching style.
6. The problem of evaluating the student's ability to debate and clarify political issues.
7. Results of an experimental attempt to teach students to use the political-legal model at the junior high school level.
8. An exploratory study into the relationship between student ability, personality, and teaching style as they may affect each other in learning to deal with political issues.

Team Teaching Project

One of the first projects undertaken by SUPRAD was an investigation into the use of teaching teams in an elementary school. The Team Teaching Project began in the fall of 1957 in the Franklin School in Lexington, an elementary school that now enrolls 500 pupils in Grades 1 through 6. In the fall of 1961 the Project was extended to the 460 pupils in the new Joseph Estabrook School, one of the first elementary schools in the United States to be designed specifically for team teaching.[9] Research and development in the Project is expected to continue

[9] For references to further information about building design, see Bibliography.

through the academic year 1963-64, with a continuing clinical relationship between the team teaching schools and the University after that time.

Background

Team teaching is an effort to attack two basic and interrelated problems common to all elementary education: (1) how to attract into and retain in the teaching profession personnel of superior quality; and (2) how to use such personnel to achieve better instruction. Reasons for the relatively high rate of turnover among teachers are not difficult to find. They include the relatively low pay, status, and prestige of the classroom teacher; the lack of adequate provisions for supervision and teacher improvement in most public schools; the lack of advancement opportunities except through administration; and the variety of non-instructional tasks which consume so much of a teacher's time. Team teaching attempts to alter these conditions by (1) organizing a school staff so that advancement is possible through a hierarchy of teaching positions; (2) providing increased pay for increased responsibility; (3) requiring teachers to work *together* in planning, carrying out, and evaluating the processes of teaching and learning; (4) providing increased opportunities for supervision and in-service education; and (5) hiring non-professional personnel to relieve teachers of many clerical and non-instructional tasks. Improved instruction is sought principally by (1) attempts to develop flexible grouping and scheduling practices with a view to more individualized instruction; (2) the development of curriculum materials more appropriate to the team organization and the goals of instruction; and (3) the assignment of staff so as to make possible the widest and most effective use of teacher talent.

The team organization thus differs from the usual self-contained classroom pattern, in which a single teacher handles most of the instruction of a group of 20 to 30 pupils throughout the entire day. This teacher is expected to have the knowledge and skill needed for competent instruction in all the subjects she must teach; she must provide as best she can for the wide range of individual needs and abilities of her pupils; and she must also perform a variety of clerical and supervisory tasks. She usually has relatively little contact with other teachers in the building, and receives relatively little supervision or assistance.

The Team Teaching Project challenges a number of commonly accepted assumptions which underly the self-contained organization. Among them are the beliefs that (1) all teachers are of approximately the same ability and should do approximately the same things, so that the superior teacher rarely influences other teachers or large numbers of pupils; (2) every teacher should be essentially autonomous, in effect a "king in his own classroom"; (3) differential roles, rewards, and status among teachers leads to poor morale and lower productivity; (4) the use of part-time and/or non-professional personnel is undesirable; (5) the ideal *size* of an instructional group is approximately 20 to 30 pupils; (6) pupils relate best to only one teacher; and (7) better and more integrated learning results when one teacher teaches all subjects.

Organization and Operation

After exploring a number of variations in team *size* and composition, the Project now uses three teaching teams of approximately equal *size* in each school, with each team responsible for 150 to 180 pupils on two adjacent grade levels. Each teaching team usually consists of six professional teachers who are organized in a hierarchical structure that includes a *team leader*, two *senior teachers*, and three *teachers*. In addition, three specialist teachers—one each in art, music, and physical education

Joint planning is an important element in team teaching. Here a group of teachers at the Harvard-Lexington Summer Program hold an informal team meeting.

—handle instruction in these subjects for pupils in all teams. Assisting the professional staff of each team are a *teacher aide* and a *clerical aide*. The flexibility of the team approach is shown by the fact that the teams can use *part-time teachers* or *interns* to fill the position of teacher, and have successfully assigned teachers on a half-year or half-time basis.

The teaching team thus includes a hierarchy of personnel with the following general qualifications and functions:

Team Leader (TL): an experienced, mature "master teacher" of unusual talent, with special knowledge of content or methodology and demonstrated leadership ability. This person is the administrative leader of the team, and is chiefly responsible for the training and supervision of junior and less experienced team personnel.

Senior Teacher (ST): an experienced, mature person with above-average talent and specialized competence in an area complementing that of the team leader.

Teacher (T): this category includes both experienced teachers of broad general training and teachers of relatively little experience.

Part-Time Teacher (PT): same as teacher, but works less than a full day.

Intern (I): a trainee in a teacher education program, doing full-time supervised teaching in a school for one semester.

Teacher Aide (TA): a mature person who enjoys direct contact with children and can supervise or work with pupils in non-instructional situations.

Clerical Aide (CA): this person helps with the routine, non-technical aspects of team operation (typing, filing, duplicating, etc.)

Because of their additional training and increased responsibilities, team leaders receive an annual salary supplement of $1,000, and senior teachers receive a supplement of $500.

By increasing the influence and responsibility of experienced staff members, the team teaching plan frees the building principal from many routine administrative details and allows him to give leadership in curriculum development, in instructional supervision, and in pupil guidance. He also helps to develop and evaluate the program, and is free to devote considerable time to the improvement of school practices in general.

The team teaching schools in Lexington have operated with a stable nucleus of "upper echelon" career people—team leaders and senior teachers—who have greater and more direct responsibility for curriculum improvement and instructional supervision. They can therefore be expected to have greater continuity in their overall program in spite of turnover at the teacher level.

It is therefore argued that a great strength of the team organization lies in the opportunity it affords to make the best possible use of leadership resources within the school. The principal and the team leaders constitute an Administrative Cabinet which formulates general school policy. These people, plus the senior teachers, have formed an Instructional Cabinet which constantly reappraises the curriculum, conducts such studies of grouping and instruction as it considers appropriate, and helps to plan and carry out in-service training for the entire staff.

Specialization and Grouping

Despite the encouragement of specialized skill and knowledge among staff members, schools in the project are *not* organized departmentally. All teachers continue to teach all, or nearly all, subjects. There are also many opportunities for teachers to specialize. Individual team members with special competence in a curriculum area plan new units of instruction, prepare and conduct large-group lessons, suggest follow-up lessons, provide in-service training for other team members, and often supervise teaching in their areas of competence.

The Project has developed flexible grouping and scheduling procedures based on the specific instructional needs of pupils, to insure that each pupil most nearly progresses at the rate of which he is capable. During a school day, pupils move from one class to another for instruction in various subjects. They are assigned to instructional groups on the basis of such factors as achievement, interest, special knowledge, or proficiency in a specific skill such as reading. The basis of group composition, and the length of time for which a particular group of pupils may be scheduled for instruction in a given subject, varies from one class period to another depending on the instructional aims involved. The entire teams may be regrouped for specific purposes or individual pupils may be reassigned to different groups at any time. Some pupils may thus have the same teacher for much of their instruction, while others will meet several different teachers during the day. Although contact with a number of different adults is a presumed advantage to most pupils, teams are free to assign each pupil to the number and kinds of teachers to whom he can relate most successfully.

In considering group size, there are indications that the "normal" group of approximately 30 pupils may be too large for some instructional purposes and too small for others. Groups ranging from one to 250 children have been used at various times. When the purpose of instruction makes a large-group lesson appropriate, several members of the teaching team are freed to work with individuals or small groups of pupils who need more specialized or individualized instruction. Some teachers may also be released for planning, observing other teachers, or meeting with parents.

In summary, then, the SUPRAD team teaching organization has identified and placed strong, talented career teachers into positions of instructional leadership and allowed them to supervise teaching, develop the curriculum, assign pupils to instructional groups, coordinate the team's instruction, plan with other teachers, and confer with parents. The team structure also makes it possible for all team members to use more time for planning and other professional activities. Through regular team meetings, cabinet meetings, and individual conferences between teachers and senior teachers or team leaders, increased opportunity is provided for communication about instructional matters. Finally, the emphasis on planning, observation, and evaluation encourages a more rigorous and self-critical attitude on the part of all team members, and provides an extension of the training period for the inexperienced teacher as well as in-service training for more experienced personnel. In theory, all of these arrangements represent advantages of team teaching over conventional patterns of school organization.

Curriculum Development and In-Service Training

The opportunity for close examination of teaching and learning, and the flexibility of grouping provided by the team structure, led to an early recognition of the need for revision of the curriculum. Examining the school's objectives, the teaching staff raised questions about the selection and organization of content. The availability of a variety of technological and self-teaching devices also resulted in numerous explorations of the ways in which this equipment could be used most effectively. Tape-recorded lessons, experimental teaching machine sequences, motion pictures, overhead projectors, television, and other technological aids have been used. During the first three years of the Project, a considerable body of curriculum materials was produced. At first it was expected that teachers would be almost entirely responsible for curriculum development and revision. However, it proved unrealistic to expect teachers to accomplish such a major task during a period when they were adjusting to the new roles and relationships

demanded by the team organization. During the past two years, consultants from Harvard and other universities and members of the Project Research and Development Staff have worked with the teachers to develop new sequences of curriculum materials in arithmetic and social studies and to strengthen the science program.

The Project has also been concerned with in-service education of teachers in the two team teaching schools. Summer workshops and leadership training seminars have been held, individual team members have taken specialized study at various universities and training centers, and consultants have been engaged for special short-term assignments. The scope of in-service activity was enlarged with the start of the Harvard-Lexington Summer Program in 1961. This program enrolled, as graduate students, experienced teachers and administrators from throughout the United States who observed and analyzed the instruction of elementary and junior high school pupils by experienced teams of teachers and aides. The program also included university course work given by the Faculty of the Harvard Graduate School of Education. Plans for the second session of the Harvard-Lexington Summer Program in 1962 included increased participation on the part of the graduate students, a heavy emphasis on curriculum concerns, and a gradual transition from the traditional organization to full-scale team operation.

Research and Development

The Research and Development Staff of the Team Teaching Project, with an office in the Franklin School, has included Harvard faculty members and graduate students with special competence in curriculum content and in such fields as psychology, testing, and observation techniques. At the start of the Project, it was recognized that team teaching includes a complex of variables which presented serious problems of control and which needed further careful analysis before any sort of comprehensive research design could be formulated. It was also recognized that a great deal of tightly-controlled experimentation was likely to be impossible in such a fluid enterprise, and that the accumulation of case data might make a significant contribution to the better understanding of the factors involved.

Great care was taken from the beginning, however, to insure that the achievement and adjustment of pupils did not suffer from exposure to the teaching teams organization. A comparison of mean scores attained on the California Achievement Test by pupils in the Franklin School and in a control school has shown no clearcut superiority in achievement for either group. A comparison, over a two-year period, of mean scores on the California Test of Personality by pupils in the Franklin School and in a control school showed no clearcut superiority in adjustment for either group. In addition, psychological observations and interviews of pupils in the Franklin School and in a control school led to the conclusion that there were no clearcut overall differences in pupil adjustment between the groups.

While there are many possible interpretations of these findings, the following two appear reasonable, in the opinion of the Project staff:

1. Pupil achievement is more closely linked to instructional technology and curriculum than to staff organization alone. Team teaching provides the mechanism and the in-service training base for the development of a truly new technology of teaching, which is still in its infancy. Considerable progress has already been made in curriculum change, but this is not yet reflected in the test data.

2. The data tend to cast doubt on the assumption that the traditional, self-contained pattern of organization is a *cause* of good pupil achievement or adjustment. If the widely-held assumptions about the organization of teaching and learning listed earlier in

this report (p. 62) were true, pupils in a team teaching school should logically have scored lower than those taught in conventionally organized schools. This has not, in fact, been the case.

The Project will continue to gather information about pupil achievement and adjustment at both the Franklin and Eastbrook schools. Since it is recognized that standardized commercial tests may not measure adequately some of the advantages to be gained from the team teaching organization, the Project is also attempting to develop more appropriate testing instruments.

A number of other research and development activities have been carried out or are in process. They have included studies of team organization, operation, and leadership; experimentation with programmed instruction in spelling and reading using so-called "teaching machines"; examination of criteria for grouping; development of more effective ways of recording and reporting pupil progress; and comparison of the effectiveness of large versus small group instruction in science. Conclusive statements about the findings of these investigations are not possible at this point.

Summary

During its first five years of operation, the Team Teaching Project has shown the following general characteristics:

Independent study is another aspect of team teaching. Here a pupil does library research in social studies.

- New patterns of pupil and teacher assignment have evolved which enable the professional staff to recognize and make increased allowance for differences among pupils. They can be grouped to achieve a narrower range of ability in a specific area, and the size and composition of instructional groups can be varied depending on the nature and purpose of the activity involved. Teachers' strengths and weaknesses are also considered in assigning them to pupil groups.
- Team teaching has stimulated the use of large-group instruction, but it has not increased the number of small instructional groups. It has enabled the most competent teacher in a given area to provide curriculum and instructional leadership for the team.
- Team operation has made it possible to release teachers from classroom instructional duties during a part of the school day.
- Experience with salaried part-time professional, semi-professional, and clerical personnel indicates the availability of qualified persons in the community who are able and willing to serve the schools.
- The opportunity to become involved in the day-to-day operation of a public school has yielded important benefits to university personnel.
- Although a conventional school building with inflexibly designed instructional areas does not facilitate the most efficient team teaching operation, neither does it make team teaching impossible.
- Cooperative planning for the instruction of pupils has resulted in teacher dissatisfaction with traditional curriculum sequences and materials and has stimulated basic curriculum revision.
- The team organization produces more clerical work, since there is more need to provide and distribute information about individual pupils, teacher assignments, pupil groupings, and lesson plans.
- Pupils react favorably toward their school experiences as a result of being regrouped for various purposes, of having increased contact with their peers, and of having contact with more adults.
- Most professional staff members have derived personal and professional satisfaction from the opportunity of working closely and sharing ideas with several colleagues.

It should be emphasized that the Project is still developing some aspects of its model and collecting information about some of the variables which it hopes to investigate. Since firm data on which to base final conclusions is still incomplete, the statements made above must be considered as tentative.

A Preliminary Assessment

Although SUPRAD has by no means completed its work, either in the form of individual projects or in efforts to develop other forms of school-university working relationships, it would still be useful to attempt an assessment of where we now stand, to suggest what has been learned from the enterprise so far, and to mention some of the problems and unanswered questions that remain.

Encouraging Progress

The past five years have seen a number of encouraging developments. Improved patterns of recruitment and training for personnel of high quality have been followed by the beginning of truly cooperative research and development projects. Some of these projects have had a certain amount of effect in changing educational practice, both within the SUPRAD membership and elsewhere in the country as well. Team teaching has captured the imagination of many educators at all levels of instruction, and hundreds of school systems throughout the country are now experimenting with it. A recent development in this area was the establishment this year of the Twenty-Nine Cooperating Communities Plan,[29] a group of school systems and colleges throughout the country which sponsors the Harvard-Lexington Summer Program and exchanges information about team teaching and other promising educational practices. Two SUPRAD school systems which experimented with the use of contract correctors, with financial support from SUPRAD, have continued this arrangement as a regular practice and now support correctors from their own budgets. Hundreds of other school systems throughout the country have requested information about this project, and many have begun using correctors themselves.

A Professional Concept

More important than any single project is the fact that

[29] Arlington, Belmont, Brookline, Concord, Lexington, Natick, Needham, Newton, Wayland, Wellesley, Weston, Winchester, Mass.; Palo Alto, Calif.; Jefferson County, Colo.; Greenwich and Westport, Conn.; Sarasota County and South Florida Education Center, Fla.; Chicago, Ill.; Montgomery County, Md.; Milford, N. H.; Glen Cove, Mount Kisco, and Norwich, N. Y.; Mount Lebanon and Pittsburgh, Pa.; Middlebury College, Vt.; and Racine, Wisc.

SUPRAD, along with many similar efforts throughout the country, has contributed to a more truly professional concept of teaching. The organization of teaching teams, whose members do different kinds of jobs involving varying degrees of responsibility and reward, offers a promising solution to the perennial problem of users pay for superior teachers which has plagued many school districts. It also provides a visible "career line" within the classroom for potential teachers. The use of content consultants, teacher aides, clerical aides, and laboratory aides relieves the teacher from many routine and time-consuming tasks which can be done by others with less training and experience. This places him more on a par with doctors, engineers, lawyers, and other professionals who have long had the help of technicians and other non-professional personnel.

Seed Money

SUPRAD has also given encouragement, in the form of both "seed money" and example, to similar or related ventures. Building on the pioneering basic research in programmed instruction and operant conditioning of Professor B. F. Skinner, SUPRAD's early inquiries in this field helped pave the way for the University-wide Harvard Committee on Programmed Instruction which was established last fall with financial assistance from the Carnegie Corporation. Through the Committee, scholars from many disciplines are working to increase the store of knowledge in this relatively new and promising field.

On the national scene, as already mentioned, 18 other institutions have received Ford Foundation support for efforts at improved teacher training or educational research and development[11] since SUPRAD was first established. It is our hope that centers of this kind will continue to develop and spread even more widely, and that funds will be found to support them at a level which will enable them to make a difference. There is more than enough room in the field for imagination, talent, and leadership.

The Teacher-Researcher

Another encouraging development is the emergence of the teacher-researcher, already mentioned earlier. Competent in both teaching and research, this person attempts to combine the two into a new role which can provide a valuable and satisfying career for those who are qualified and interested. Universities have long recognized that their faculty members need time for research, both as a creative outlet which fulfills the university's responsibility to increase knowledge and because of its potential contribution to better teaching. The teacher-researcher in the schools, working on research questions which grow out of his continued contact with classroom problems, stands to profit no less from this kind of arrangement. His activities also promise to increase the contributions of research and development to educational theory and practice.

SUPRAD has also helped to improve the general climate within which both schools and the University do their jobs. It has encouraged more open communication and more joint decision-making between these agencies. It has reinforced efforts on both sides to question, change, and improve existing knowledge and practice, and to evaluate the results of these efforts. By bringing the professor into closer contact with the problems of the schools, it has brought about more sophistication, both theoretical and practical, to research and development on school problems than would be available to either school or university alone. In short, both the teacher and

[11] For a recent report on one such program, see *Making Teaching and Learning Better*: the Wisconsin Improvement Program, 1959-61, published by the School of Education, University of Wisconsin, Madison 6, Wisc.

SUPRAD has encouraged the development of "career" teachers like the two shown working with pupils, left.

the professor have benefited from rubbing elbows in the arena of theory and practice.

Problems and Facts of Life

An enterprise like SUPRAD could hardly have operated for five years without encountering problems. Some of these problems result from the nature of the cooperative relationships involved; others are perennial in American education.

Not surprisingly, cooperative educational research and development in a "real-life" situation is extremely complex and difficult. Changes in one aspect of the existing situation frequently cause or require unforeseen changes in others. Neat, closely-controlled research, of the type which is frequently possible in the physical sciences, is rarely possible when the subjects involved are human beings. The school-university relationship, which requires collaboration among sovereign entities, inevitably leads to a certain amount of friction, misunderstanding, and suspicion on both sides. For example, the purposes and design of a research project may require change in the organization or operation of a school which teachers consider as unwarranted interference with their work. School Committees and administrators, with both legal and moral responsibility for the well-being of pupils entrusted to their care, are understandably reluctant to abdicate this responsibility. Joint decision making and action in this context is obviously not a simple matter, and requires mutual respect and forebearance.

A frequent problem has been the fact that the evaluation instruments and techniques available to researchers have been ineffective or unsuitable to the task. Standardized commercial measures of academic achievement, for example, may not be appropriate in a team teaching school in which instructional aims, curriculum content, and teaching methods have been considerably different from conventional patterns. Efforts to predict the leadership performance of team personnel have not as yet been satisfactory because of the limitations of the psychological instruments and subjective judgments necessarily employed. In an experimental situation as complex as a classroom, it is extremely difficult to isolate and control the variables involved and therefore to establish direct cause-and-effect relationships among them.

Investment in Progress

A fact of life in cooperative research and development is the need for consistent, long-term commitments of time, talent, and money. Limited, short-term efforts are unlikely to be effective either in advancing knowledge or in changing educational practice. Patient, thorough, lengthy efforts are expensive, both in human time and in dollars, but they offer the most promise of achieving results. A lesson from a related venture may be instructive here. The Physical Science Study Committee spent five years and five million dollars, not to mention the time of hundreds of high school teachers and university scientists, in developing a single one-year course in modern physics for high school students.

One reason for such a high price tag on progress is the fact that educational research and development so often requires large investments in curriculum development and in-service training. SUPRAD's projects have been no exception. New concepts and techniques cannot very often be successfully tested within the limitations of the existing syllabus or with conventional curriculum materials. It has frequently been necessary to conduct costly, time-consuming efforts at curriculum development and revision before a project reaches the stage at which it can proceed with its intended design. It is also clear that teachers cannot reasonably be expected to carry out curriculum revision by themselves as a spare-time effort. With a few outstanding exceptions, teachers

lack the time, the specialized knowledge, or the energy after a day's work to do this important job effectively. SUPRAD has therefore provided them with increasing amounts of help and consultation from the University.

Nearly all SUPRAD projects have encountered the need for more and more effective in-service training of teachers. Unconventional teaching methods, unfamiliar curriculum materials, drastically changed professional roles, and new theoretical and philosophic concepts all require changed attitudes and new knowledge and skill on the part of the teaching staff. With the best will in the world, teachers cannot be expected to function effectively unless they are prepared for the jobs they are called upon to do and understand the rationale, procedure, and expectations involved.

Unfinished Business

One area of unfinished business is the need to integrate teaching and research more closely as interrelated parts of the educational process, with each affecting and helping the other. Practitioners in the schools need more sophistication about the nature and kinds of research, the levels on which it can be conducted, its contributions and limitations, and the complexity of the process. While the development of the teacher-researcher has made a start in this direction, much more remains to be done. Research is also likely to have more influence on practice if it is based more firmly on a knowledge of actual school operations, is comprehensible to the teacher, and is seen as relevant to the problems he considers important. This means finding more effective ways of distributing new knowledge and translating it into educational practice than now exist.

At the risk of repeating the obvious, there is a crying need for more permanent, unrestricted funds to support programs of training, research and development, and dissemination. In general, the scale of financing for such efforts nationwide has been far too low. Even the relatively large amount available to SUPRAD during the past five years has enabled it to make only a start on the investigation of certain fundamental educational problems. A vast expansion of this and similar efforts is sorely needed if American education is to make significant progress in the years ahead. All this will cost money, in amounts which neither school systems nor universities can provide. A combination of private and public support—local, state, and federal—will be required.

Some Unanswered Questions

Finally, there are questions, most of them unanswered—at least, to our satisfaction. Among them are these:

- How can talented people in schools and universities be persuaded to choose careers in cooperative educational research, and how can these careers be made rewarding to both?
- How much time, effort, and money should be spent on research and development aimed at long-range improvement, and how much should be directed toward the solution of more immediate and specific problems?
- How can the knowledge, skill, and experience of school and university staffs be more effectively combined, for the benefit of both institutions and of the larger public which they serve?
- How can a spirit of innovation, inquiry, and change be cultivated and sustained at a level sufficient to keep the enterprise in motion, while at the same time retaining the necessary suspended judgment and emphasis on long-range results?

These questions—and others yet to be asked—will call for the highest possible caliber of thought and action by people in both schools and universities in the years ahead. In our judgment, the task has only begun.

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LIST OF PROJECTS

Since 1957, SUPRAD has supported or cooperated in the following projects. Names given are those of project directors or participating agencies. Except where otherwise indicated, information about these projects and about SUPRAD may be obtained from the Assistant Director, 94 Prescott Street, Cambridge 38, Massachusetts.

Completed Projects

Behavioral Sciences Curriculum Project
Morris L. Cogan, Harvard University
Robert A. Feldmesser, Brandeis University

Clinical Training for the Administrative Career Program: studies in Concord, Lexington, and Newton
Harvard Center for Field Studies
(reports out of print)

Contract Correcting: The Use of Lay Readers in the High School Composition Program
Edwin H. Sauer, Harvard University
(see bibliography entry)

Language Laboratory Project
Elaine M. Hardie, Concord-Carlisle High School

The Use of Recordings in the Teaching of Foreign Languages
Raymond T. Ethier, Newton High School

The Involvement of Laymen in the Teaching of Mathematics
Norton Levy, Concord-Carlisle High School

Methods for Disseminating Research Information to School Personnel
Wade M. Robinson, Leonard M. Lansky, and Paul A. Perry, Harvard University

Newton Plan Evaluation
John B. Carroll, Harvard University
(report presently unavailable)

Programmed Instruction in Junior High School Mathematics
Paul G. Dickie, Emerson Junior High School, Concord

A Supplementary Program in Junior High School Mathematics
Paul G. Dickie, Emerson Junior High School, Concord
(see bibliography entry)

Teaching High School Students a Critical Approach to Contemporary National Issues
Donald W. Oliver, Harvard University

Current or Continuing Projects

Application of Modern Data Processing Techniques to Problems of Public Education in New England
Donald P. Mitchell, New England School Development Council
G. Ernest Anderson, Jr., Newton Public Schools
John Caffrey, Harvard University

Junior High School Grouping Project
William G. Blount, Newton Public Schools

Teaching Teams Project, Lexington
Robert H. Anderson, Harvard University
John M. Bahner, Harvard University

New Projects Authorized for 1962-63

Behavior Change in Underachievers
Richard Alpert, Harvard University

Planning for Research, Training, and Pupil Service in Guidance
David V. Tiedeman, Harvard University

Exploration of the Establishment of a Social Studies Curriculum Development and Research Center
Donald W. Oliver, Harvard University

SOME RELATED HARVARD DOCTORAL THESES

Belanger, Maurice L.; "An Exploration of the Use of Feedback in Supervision", June, 1962.

Hagstrom, Ellis A.; "A Methodological Study to Assess Differences in Staff Utilization in Two Elementary Schools", June, 1960.

Herriott, Robert E.; "Factors Influencing the Educational Aspiration of Adolescents", June, 1962.

Hively, Wells; "Programming Stimuli in Matching to Sample", June, 1961.

Mok, Paul P.; "Descriptive Syndrome Screening: An Exploratory Study of Teacher Identification of Emotional Disturbances of Elementary School Pupils", June, 1959.

O'Hara, Robert P.; "A Cross-Section Study of Growth in the Relationship of Self Ratings and Test Scores", June, 1958.

Porter, Douglas; "Spelling Taught by Machine: An Application of Reinforcement Psychology to Classroom Teaching", June, 1961.

Purpel, David E.; "The Comprehension of Written Social Studies Content as a Function of Amplification and Topic", June, 1961.

Resnick, Lauren B.; "The Handling of Contradictory Information: A Study in the Effects of Cognitive Need, Cognitive Style, and Motivational Arousal", March, 1962.

Shaver, James P.; "A Study of Teaching Style: The Investigation through Systematic Observation of the Ability of Experimental Teachers to Conform to Two Models of Teaching", June, 1961.

Wong, Ruth Hie-King; "A Study of Student Progress Through Grouping Associated with a Program of Sequenced Instruction in Elementary School Mathematics", June, 1962.

FINANCIAL SUMMARY

The following summary, compiled as of June 30, 1962, shows: (1) financial support for SUPRAD during its first five years of operation; (2) funds committed to the support of SUPRAD for the next five years; (3) other related activities which were included in the eight-year Ford Foundation grant to the Harvard Graduate School of Education in 1959.

1. *Support for SUPRAD, 1957-1962*	
Contributions toward direct costs from government and private grants and contracts, 1957-62	146,000*
Support from the Fund for the Advancement of Education and Ford Foundation, 1957-62	938,000*
	$1,084,000
2. *Ford Foundation Funds Committed to Support of SUPRAD, 1962-67*	554,000
TOTAL SUPPORT RECEIVED AND COMMITTED	$1,638,000
3. *Support for Related Activities from Eight-year Ford Foundation Grant, 1959-67*	
Recruitment, training, and career development: scholarships, fellowships, and other financial aid to students	943,000
Improved relationships between scholars and educators: faculty and staff to link scholars and the schools	763,000
TOTAL SUPPORT FOR RELATED ACTIVITIES, 1959-67	$1,706,000
GRAND TOTAL AVAILABLE AND COMMITTED, 1957-67	$3,344,000

*These figures do not include contributions of staff time and facilities by cooperating school systems; time of Harvard faculty consultants to SUPRAD projects; or indirect costs to the University or to cooperating school systems.

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The following selection of publications and other materials, mostly of recent date, deals with (1) the general questions of teacher training, school-university relationships, and educational research and development; and (2) specific projects or problems with which SUPRAD and other organizations or individuals have been concerned.

General Questions

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